



United States  
Department of  
Agriculture

Soil  
Conservation  
Service

In cooperation with  
Pennsylvania State University  
College of Agriculture  
and the  
Pennsylvania Department of  
Environmental Resources,  
State Conservation Commission

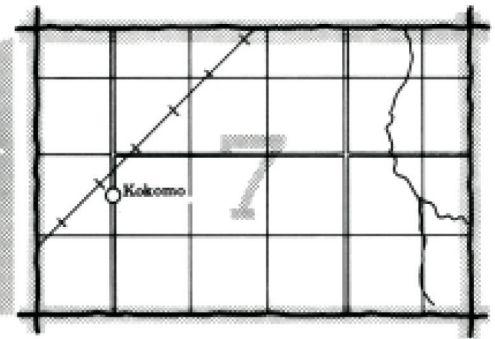
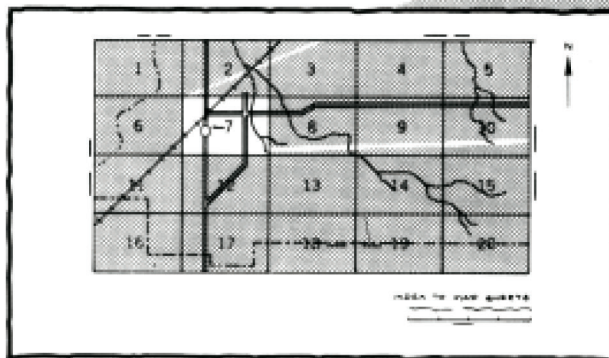
# Soil Survey of Lancaster County Pennsylvania





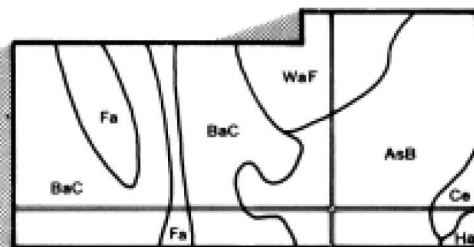
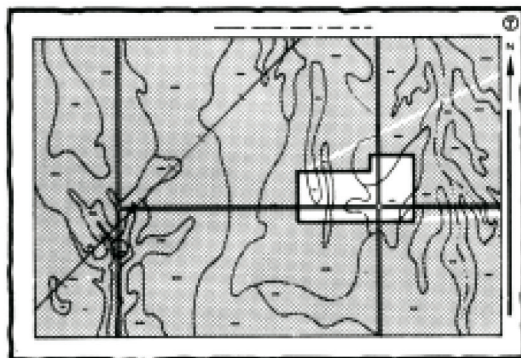
# HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

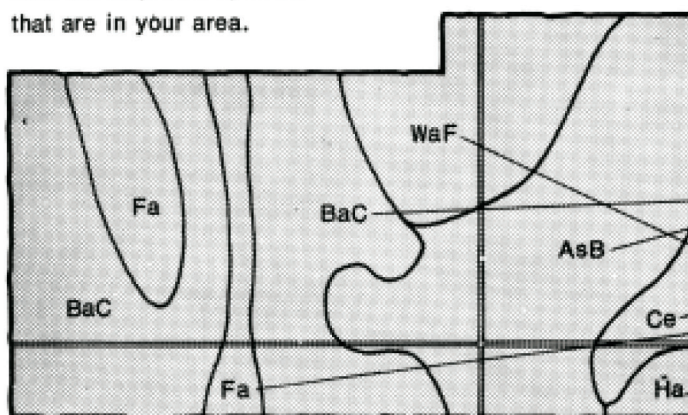


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area.



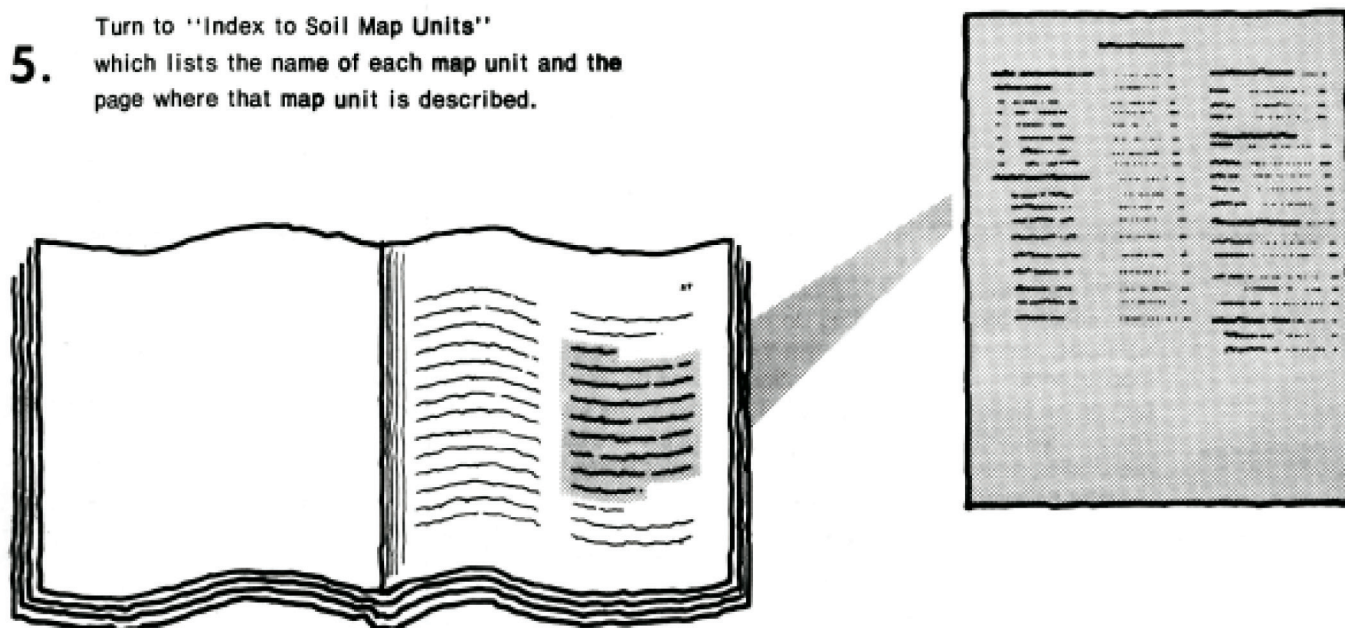
## Symbols

AsB  
BaC  
Ce  
Fa  
Ha  
WaF

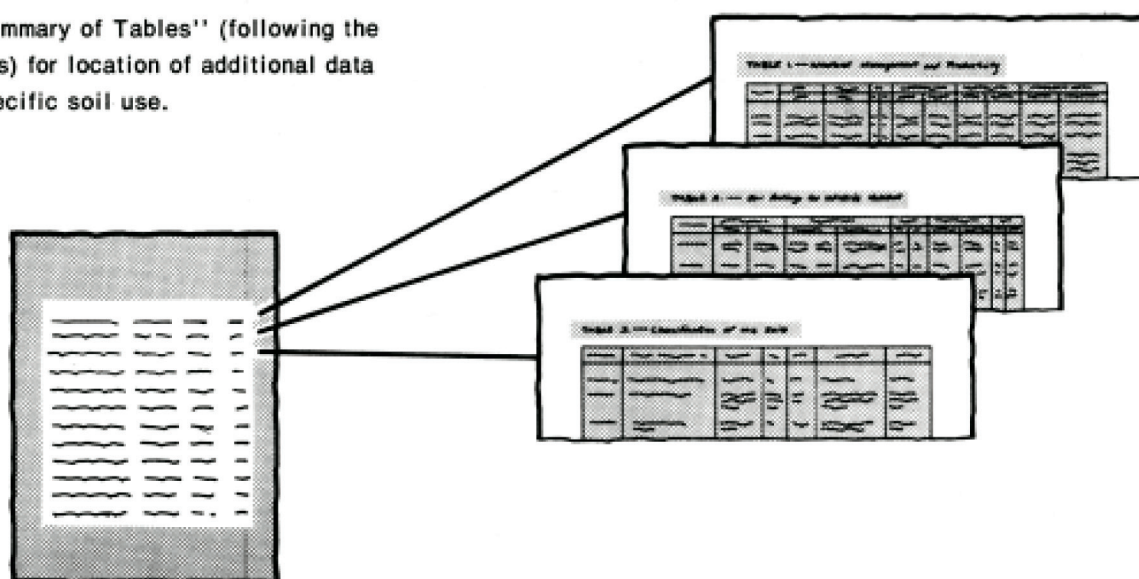


# THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1981. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service, the Pennsylvania State University College of Agriculture, and the Pennsylvania Department of Environmental Resources, State Conservation Commission. The survey is part of the technical assistance furnished to the Lancaster County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

**Cover: Foreground: Tobacco on Duffield silt loam, 0 to 3 percent slopes. Background: Corn on Duffield silt loam, 3 to 8 percent slopes. (Courtesy of Grant Hellman)**



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# Foreword

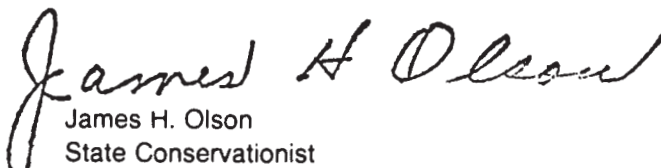
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This soil survey contains information that can be used in land-planning programs in Lancaster County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

  
James H. Olson  
State Conservationist  
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# Soil Survey of Lancaster County Pennsylvania

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By Boyd H. Custer, Soil Conservation Service

Fieldwork by Boyd H. Custer, Edward J. Merkel, Michael Yaworski,  
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United States Department of Agriculture  
Soil Conservation Service  
In cooperation with  
Pennsylvania State University College of Agriculture and the  
Pennsylvania Department of Environmental Resources,  
State Conservation Commission

Lancaster County is in the southeastern part of Pennsylvania (fig. 1). The land area of the county is 605,500 acres, or about 946 square miles, about 80 percent of which is suitable for cultivation. Many of the

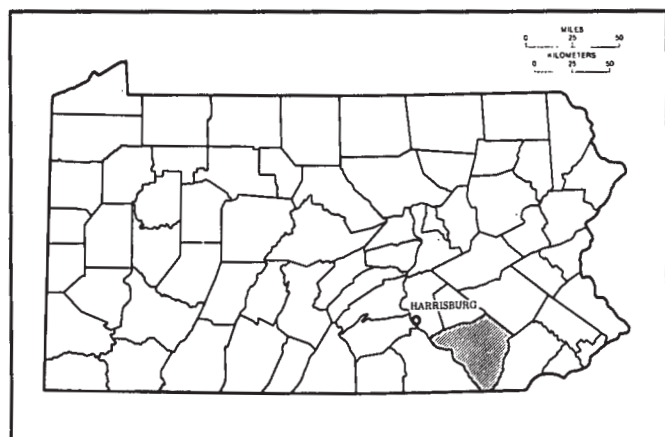


Figure 1.—Location of Lancaster County in Pennsylvania.

soils are intensively cultivated and need adequate protection to help control erosion. Many of the soils are suited for urban development, but some are limited by slope, wetness, stones on the surface, or the depth to bedrock.

The county was organized from part of Chester County in 1729 and was the fourth county formed in Pennsylvania. Lancaster City, the largest inland town in colonial America, was established in 1730.

The 1980 census lists the population of Lancaster County as 362,346. The city of Lancaster is the county seat and in 1980 had a population of 54,725. The boroughs in the county with populations of more than 10,000 are Columbia and Ephrata. Those with a population of more than 5,000 but less than 10,000 are Mount Joy, Millersville, Manheim, Elizabethtown, and Lititz (9).

## General Nature of the Survey Area

This section provides information about some of the natural and cultural factors that influence the soils of Lancaster County.

## Geology

Lancaster County is in the Piedmont physiographic province and is divided into three sections. The extreme northern part of the county is in the Triassic Lowland and is underlain by conglomerate, sandstone, shale, and diabase. The north-central and central parts are in the Conestoga Valley and are underlain by carbonate rocks and shale. The southern part of the county is in the Piedmont Upland and is underlain by metamorphic rocks.

Most of the rocks underlying Lancaster County had their origin 600 million to 400 million years ago, but some are Precambrian crystalline rocks, which are more than 600 million years old.

Horizontal layers of sand, gravel, silt and lime materials were deposited in a sea that covered the area. Repeated deposition and consolidation formed the sediments into rock strata. Near the end of the Paleozoic era, 230 million years ago, tectonic forces from the southeast raised the rock strata above sea level. The formations were folded, faulted, and tilted by lateral tectonic forces. Intrusion of molten volcanic materials and tectonism recrystallized some sedimentary and igneous rocks into metamorphic rocks. Repeated disturbances and uplifts, along with natural erosion, exposed rocks of different ages, and formed peneplains.

Gradual uplift, along with vertical faulting in the northern part of the county, produced a sunken trough. Deposition into this trough during the Triassic period, 230 million to 180 million years ago, produced the characteristic red sandstone and shales. Igneous intrusions and uplift, tilting, and faulting altered these rocks.

Subsequent uplift and erosion of the Lancaster County area occurred several times. The present landscape is the result of weathering action on the last of the uplifted plains.

Exposed rocks in the area were formed during the Precambrian, Cambrian, Ordovician, and Triassic periods.

The Precambrian and Lower Paleozoic ages produced schist, serpentine, quartzite, and other metamorphic and igneous rocks. Exposures of these rocks are in the southern part of Lancaster and in the Welsh Mountain area. Soils in the Manor-Chester-Glenelg and Clymer-Chester units of the general soil map are dominant in these areas.

The upper formations of the Cambrian period are dolomite and limestone. These rocks form a west-to-east band across the widest part of the county. Soils in the Duffield-Hagerstown unit are dominant in these areas. The Antietam, Harpers, and Chickies Formations are phyllite, schist, and quartzite. These rocks are in the west-central and east-central areas of the county. Soils in the Manor-Chester-Glenelg unit are dominant in these areas.

The Cocalico, Conestoga, and Beekmantown Formations are of Ordovician age. The Cocalico

Formation consists of shale and is in the north-central part of the county. Soils in the Bedington unit are dominant in these areas. The Conestoga Formation consists of crystalline limestone and dolomite and thin graphitic and micaceous beds. The formation is in a wedge-shaped band that narrows eastward across the central part of the county. Soils in the Letort-Pequea-Conestoga unit are dominant in these areas.

The Beekmantown Group consists of limestone and dolomite that form two extensive belts north of the Cambrian-period rocks. Soils in the Duffield-Hagerstown unit are dominant in these areas.

The Triassic-age rocks are along the northern borders of the county. These are mostly red shale, sandstone, and conglomerate. Diabase is in sheets intruded between beds of sedimentary rock. The dominant soils are in the Ungers-Bucks-Lansdale unit.

## Mineral Resources

The major mineral resources of Lancaster County are limestone, sandstone, serpentine, diabase, clay, perlite, sand, and gravel. Ores containing the elements iron, zinc, lead, nickel, copper and silver are in various locations in the county.

Several quarries in Lancaster County produce lime for agriculture, building stone, aggregate, cement, and fluxstone. Sandstone is quarried from the Chickies formation and generally is crushed for building sand. Clay is mined in the Welsh Mountain area. The main uses are for structural and filler material, pesticides, water treatment, and refractory material. A few sand and gravel pits produce material for buildings, roads, and concrete. Serpentine mined in the southern part of the county provides concrete aggregate, road material, and railroad ballast. The largest diabase intrusions are in the northeastern and northwestern parts of the county. The main uses are for asphalt filler, railroad ballast, and construction.

## Water Resources

Lancaster County is almost entirely within the Susquehanna River Basin, except for about 2,000 acres in the eastern part of the county which drain into the Brandywine watershed of the Delaware River Basin. The principal streams of the county are the Conestoga and Susquehanna Rivers and the Conewago, Conoy, Chickies, Pequea, Conowingo, and Octoraro Creeks.

The primary sources of water are streams, dug and drilled wells, springs, and reservoirs. Urban areas get most of their water from streams, reservoirs, springs, and wells. Rural areas are served mostly by wells. Supplies for irrigation and animal consumption are mainly from farm ponds, streams, and springs.

The limestone formations are the highest yielding aquifers in Lancaster County. The water is hard. Solution



channels and caverns reduce filtration of water entering the limestone, and consequently the water sometimes contains contaminants. Shale formations yield small to moderate volumes of soft to moderately hard water. Schist formations yield moderately large volumes of soft water. Water supplies from quartzite are soft but generally of limited supply.

No major natural lakes exist in Lancaster County, but there are several manmade lakes. Lake Clark, Lake Aldred, and Conowingo Lake are on the Susquehanna River and are used for power generation. Muddy Run Dam holds a 640-acre lake on Muddy Run and is used for power generation. Speedwell Forge, covering 106 acres, is used for recreation. The 669-acre Octoraro Lake is used for water supply.

## Transportation

The county is crossed by 1,290 miles of State highways and 2,050 miles of local secondary roads. The major highways are U.S. Routes 30, 222, and 322; Interstate Route 76 (Pennsylvania Turnpike); and Pennsylvania Routes 283, 72, and 23.

The county has local fixed-route and long-distance bus service and three railroads. Five public and fifteen private airports are in the county. Lancaster Municipal Airport is the only facility with regularly scheduled air service.

## Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Ephrata in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 31 degrees F, and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Ephrata on February 27, 1963, is -10 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred at Ephrata on July 3, 1966, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 43 inches. Of this, 24 inches, or 56 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April

through September is less than 12 inches. The heaviest 1-day rainfall during the period of record was 5.8 inches at Ephrata on June 22, 1972. Thunderstorms occur on about 30 days each year, and most occur in summer.

The average seasonal snowfall is 27 inches. The greatest snow depth at any one time during the period of record was 22 inches. On an average of 7 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 9 miles per hour, in spring.

## Farming

In recent years the number of farms and total farm acreage have decreased in the county and the average size of farms has increased. In 1964, there were 6,247 farms, and the average size was 75 acres. In 1978 there were 4,915 farms, and the average size was 87 acres. The total farm acreage decreased from 467,321 acres in 1964 to 425,561 acres in 1978.

In 1980 the county produced about 11,339,000 bushels of corn, 1,065,000 tons of silage, 1,224,000 bushels of wheat, 22,860,000 pounds of tobacco, and 224,000 tons of hay. The number of livestock on farms in 1980 consisted of about 289,000 cattle and calves, 337,000 hogs and pigs, 6,000 sheep and lambs, and 42,106,000 broilers and 7,579,400 layers (3).

## How This Survey was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.



The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined

management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, and woodland managers, engineers, planners, developers and builders, home buyers, and others.

This soil survey provides updated information to soil surveys of Lancaster County that were published in 1900, 1914, and 1959, and contains maps that show the soils in greater detail.

# General Soil Map Units

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The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some of the boundaries of the general soil map of Lancaster County do not match those of the maps of adjoining counties and Maryland. These discrepancies exist because of changes in soil classification and different proportions of the same series in different counties.

## Soil Descriptions

### 1. Manor-Chester-Glenelg

*Nearly level to very steep, well drained soils on broad ridgetops and side slopes; formed in residuum from mica schist, granitized schist, quartzite, and gneiss*

This unit makes up about 31 percent of the county. The landscape consists of broad, gently sloping to moderately steep, rolling ridges and some steep and very steep side slopes adjacent to major streams. The unit is about 32 percent Manor soils, 30 percent Chester soils, 23 percent Glenelg soils, and 15 percent soils of minor extent (fig. 2).

The Manor soils have a medium textured subsoil. They have less clay in the subsoil than Chester or Glenelg soils. They dominantly are sloping to very steep, but some areas are gently sloping.

The Chester soils have a medium textured and moderately fine textured subsoil. The combined thickness of the surface layer and subsoil is 30 to 50 inches. The soils dominantly are gently sloping, but some are nearly level or sloping.

The Glenelg soils have a medium textured subsoil. The combined thickness of the surface layer and subsoil is 18 to 25 inches. The soils dominantly are sloping, but some are gently sloping or moderately steep.

The minor soils are poorly drained Baile soils, moderately well drained and somewhat poorly drained Glenville soils, somewhat poorly drained Newark soils, and well drained Comus soils.

This unit is generally in cropland, and most areas are well suited to this use. Some areas are wooded or are in urban development. Slope is a limitation for nonfarm uses in some areas.

### 2. Duffield-Hagerstown

*Nearly level to steep, well drained soils in undulating broad valleys; formed in residuum from limestone*

This unit makes up about 28 percent of the county. The landscape consists of nearly level to rolling hills in limestone valleys dissected by drainageways. The unit is about 42 percent Duffield soils, 40 percent Hagerstown soils, and 18 percent soils of minor extent.

The Hagerstown soils have a reddish, moderately fine textured and fine textured subsoil. The soils mainly are nearly level to sloping, but some areas are moderately steep or steep.

The Duffield soils have a brownish, moderately fine textured subsoil. The soils are nearly level and gently sloping.

The minor soils are well drained Nolin and Chester soils, moderately well drained Clarksburg and Lindsides soils, and somewhat poorly drained Newark soils.

This unit mainly is in cropland, and most areas are well suited to this use. Sinkholes and the possibility of ground water contamination are limitations of the soil, and slope is a further limitation for nonfarm uses in some areas.

### 3. Ungers-Bucks-Lansdale

*Nearly level to very steep, well drained soils on ridges, side slopes, and foot slopes; formed in residuum from Triassic siltstone, conglomerate, shale, and sandstone*

This unit makes up about 19 percent of the county. The landscape consists of dissected rolling hills and moderately wide foot slopes. The unit is about 34 percent Ungers soils, 19 percent Bucks soils, 13 percent Lansdale soils, and 34 percent soils of minor extent.

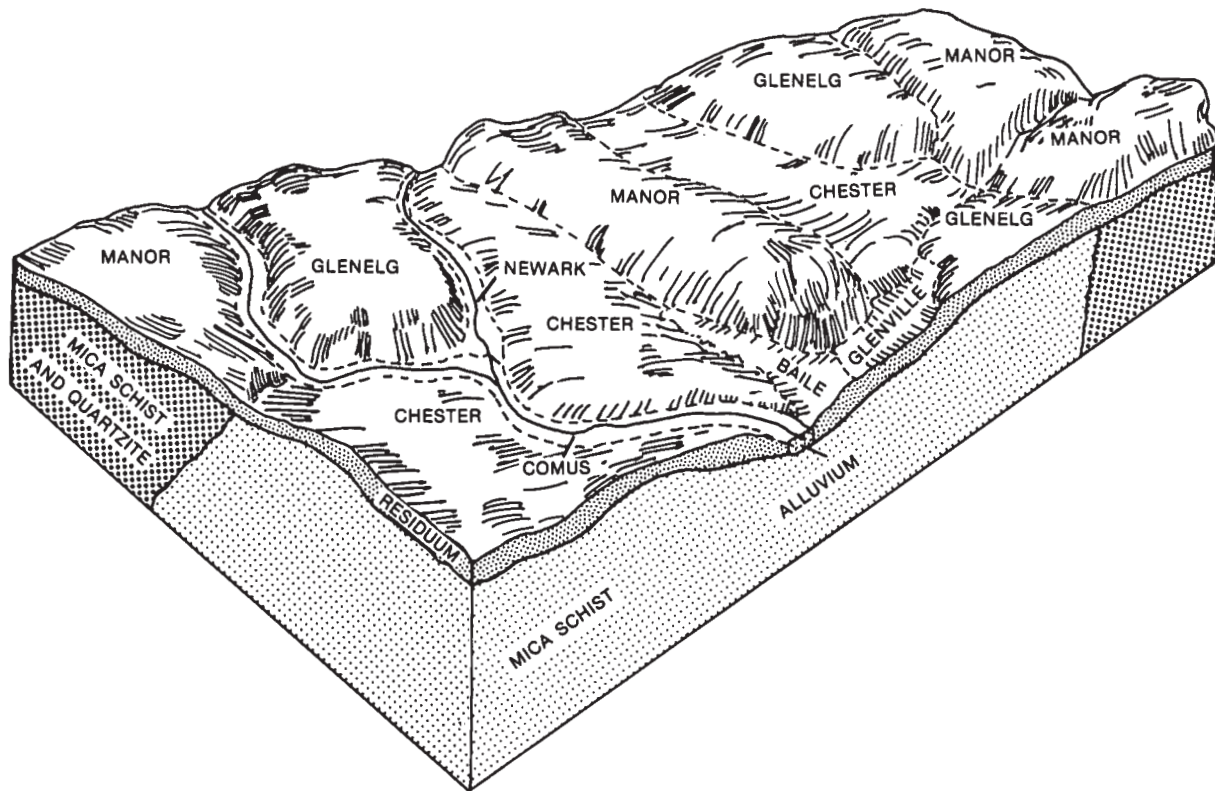


Figure 2.—Typical pattern of soils and underlying material in the Manor-Chester-Glenelg unit.

The Ungers soils have a red, medium textured and moderately fine textured subsoil and are more than 5 percent rock fragments in the surface layer and upper part of the subsoil. The soils dominantly are sloping and moderately steep, but some areas are gently sloping, steep, or very steep.

The Bucks soils have a red, medium textured and moderately fine textured subsoil and are less than 5 percent rock fragments in the surface layer and upper part of the subsoil. The soils mainly are gently sloping and sloping, but some areas are nearly level or moderately steep.

The Lansdale soils have a brown, moderately coarse textured and moderately fine textured subsoil. The soils mainly are gently sloping and sloping, but some areas are moderately steep.

The minor soils are well drained Brecknock soils; moderately well drained Readington soils; moderately well drained and somewhat poorly drained Lehigh, Mount Lucas, and Rowland soils; somewhat poorly drained Abbottstown soils; poorly drained Holly soils; and somewhat poorly drained and poorly drained Bowmansville soils.

About half of this unit is used for farming, and most areas are well suited to this use. The remaining areas

are mostly wooded, and some small areas are used for homesites and recreation. Slope and stoniness are the main limitations of some areas for nonfarm use.

#### 4. Letort-Pequea-Conestoga

*Nearly level to very steep, well drained soils on side slopes of ridges; formed in residuum from graphitic and micaceous limestone and schist*

This unit makes up about 12 percent of the county. The landscape consists of nearly level to rolling upland valleys and ridges dissected by drainageways and a few intrusions of mica schist. The unit is about 27 percent Letort soils, 17 percent Pequea soils, 17 percent Conestoga soils, and 39 percent soils of minor extent (fig. 3).

The Letort soils have a dark grayish brown, medium textured subsoil. The soils dominantly are gently sloping, but some areas are nearly level or sloping.

The Pequea soils have a medium textured subsoil. The soils dominantly are sloping and moderately steep, but some areas are steep or very steep.

The Conestoga soils have a brown, medium textured and moderately fine textured subsoil. The soils



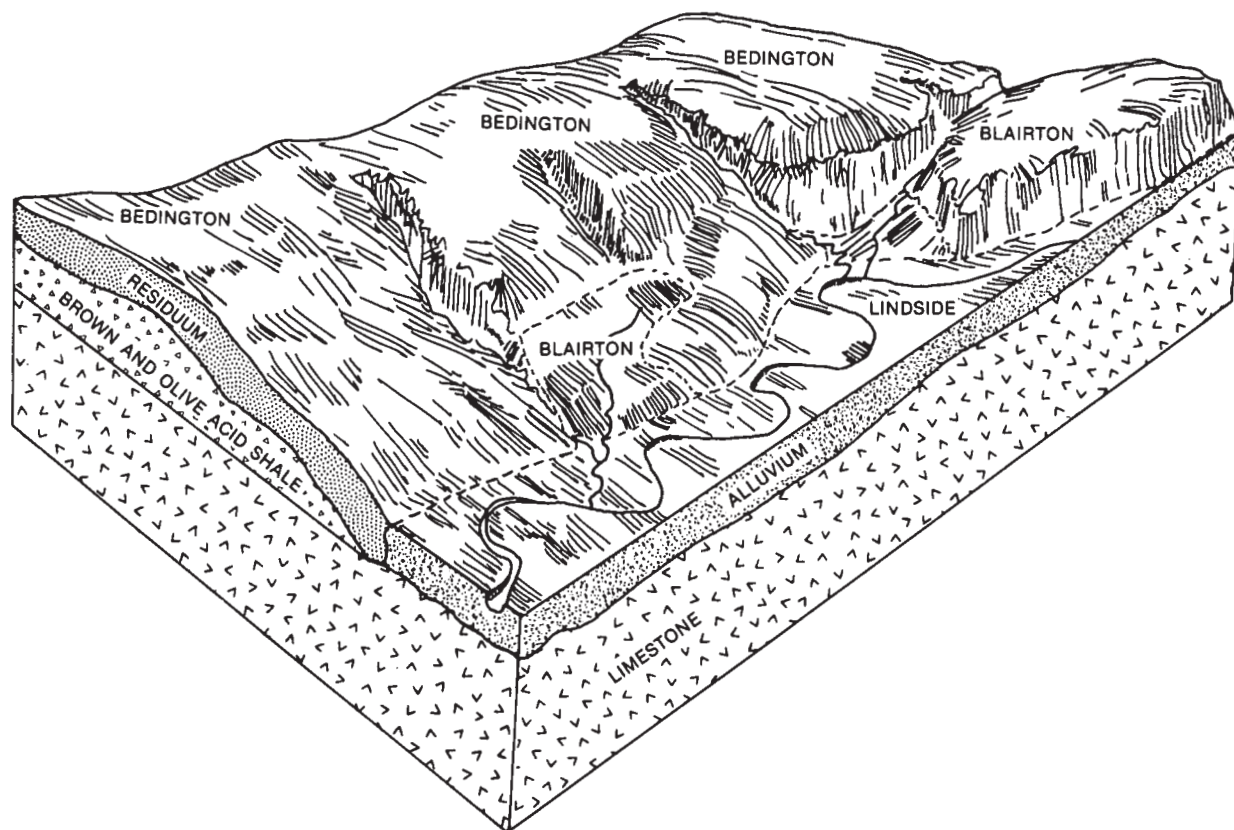


Figure 4.—Typical pattern of soils and underlying material in the Bedington unit.

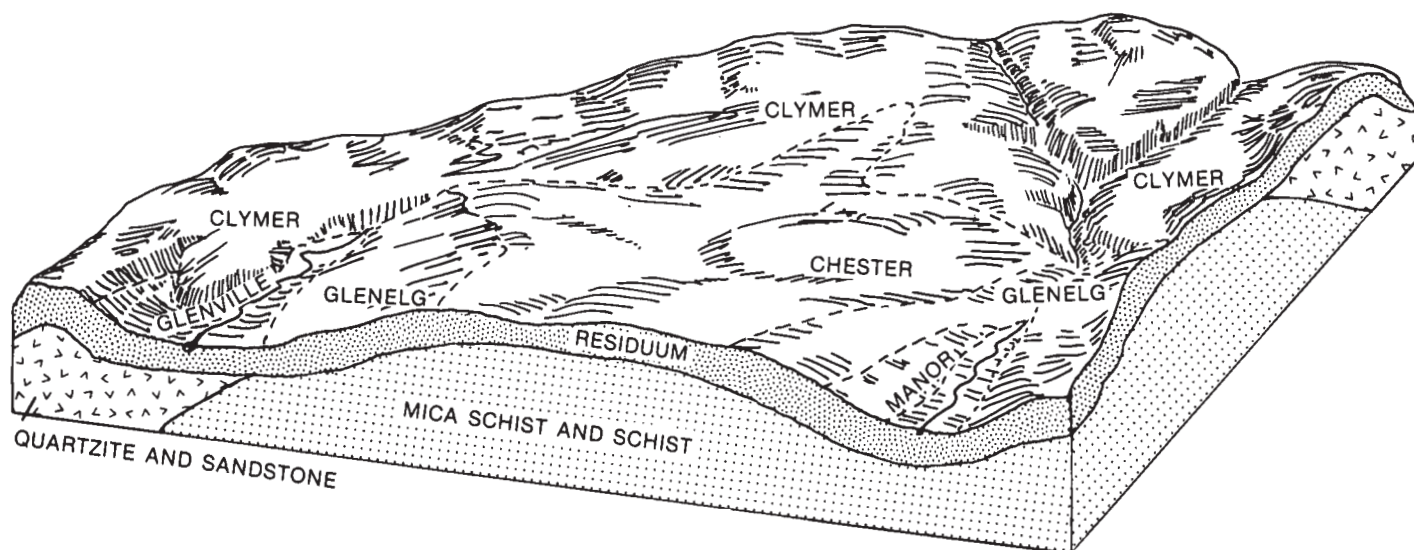


Figure 5.—Typical pattern of soils and underlying material in the Clymer-Chester unit.



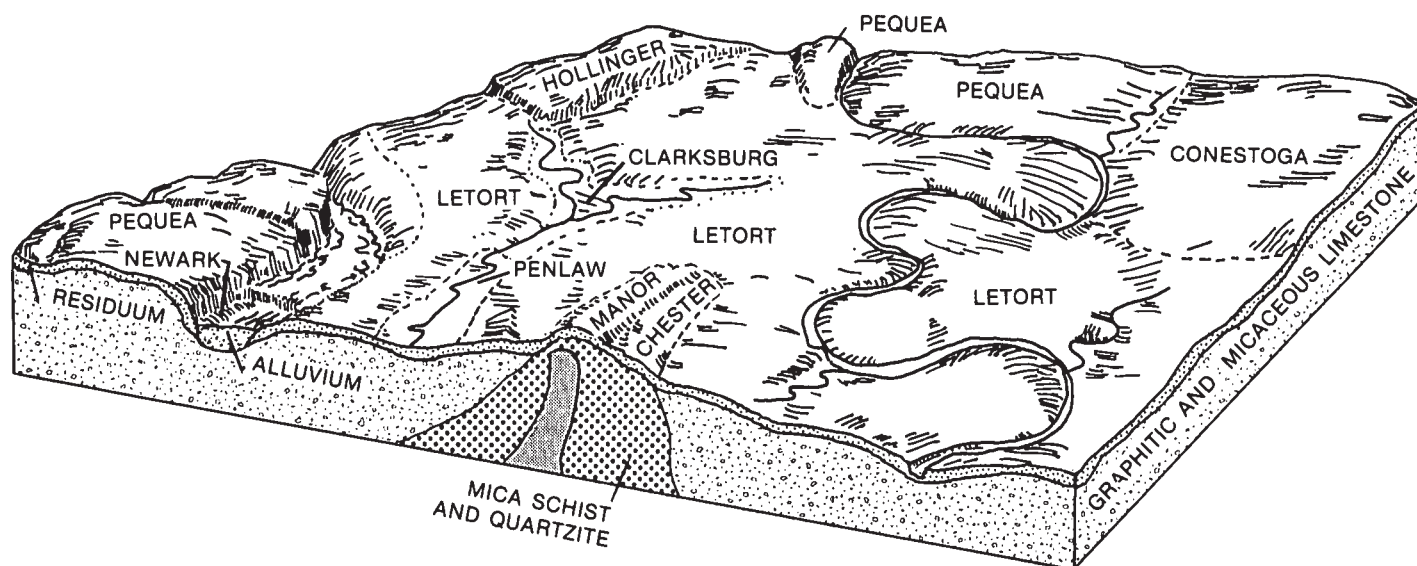


Figure 3.—Typical pattern of soils and underlying material in the Letort-Pequea-Conestoga unit.

dominantly are gently sloping, but some areas are nearly level or sloping.

The minor soils are well drained Manor, Chester, and Hollinger soils; somewhat poorly drained Penlaw soils; moderately well drained Clarksburg soils; and somewhat poorly drained Newark soils.

This unit is mostly in cropland, and most areas are well suited to this use. Some areas are wooded or in urban use. Slope is the main limitation for nonfarm uses in some areas.

## 5. Bedington

*Nearly level to moderately steep, well drained soils on dissected ridgetops and side slopes; formed in residuum from acid shale*

This unit makes up about 8 percent of the county. The landscape consists of nearly smooth to rolling, dissected ridges. The unit is about 75 percent Bedington soils and 25 percent soils of minor extent (fig. 4).

The Bedington soils have a medium textured and moderately fine textured subsoil. The soils dominantly are gently sloping and sloping, but some areas are nearly level or moderately steep.

The minor soils are moderately well drained Lindsie soils and moderately well drained and somewhat poorly drained Blairton soils.

This unit is mostly in cropland, and most areas are

well suited to this use. Some areas are wooded or in urban uses. Slope is the main limitation for nonfarm uses in some areas.

## 6. Clymer-Chester

*Nearly level to very steep, well drained soils on broad ridges; formed in residuum from sandstone, mica schist, and quartzite*

This unit makes up about 2 percent of the county. The landscape ranges from nearly level ridgetops to very steep side slopes of ridges. The unit is about 64 percent Clymer soils, 23 percent Chester soils, and 13 percent soils of minor extent (fig. 5).

The Clymer soils have a moderately coarse textured and moderately fine textured subsoil. The soils dominantly are sloping and moderately steep, but some areas are gently sloping, steep, or very steep.

The Chester soils have a medium textured and moderately fine textured subsoil. The soils dominantly are gently sloping and sloping, but some areas are nearly level.

The minor soils are well drained Manor and Glenelg soils and moderately well drained to somewhat poorly drained Glenville soils.

This unit is mostly wooded. Some areas are farmed or are in nonfarm uses. Slope and stoniness are the main limitations for nonfarm use.

# Detailed Soil Map Units

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The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Manor very stony silt loam, 25 to 60 percent slopes, is one of several phases in the Manor series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils or a soil and a miscellaneous area in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the components of the complex are somewhat similar in all areas. Hagerstown-Urban land complex is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can

be made up of only one of the major soils, or it can be made up of all of them. Fluvaquents and Udifluvents, loamy, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

## Soil Descriptions

### **AbB—Abbottstown silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and somewhat poorly drained. It is in depressions and drainageways. Slopes are broad and concave and are mainly less than 400 feet in length. The areas of this soil are irregular in shape and range from 3 to 120 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is mottled and is 32 inches thick. The upper 14 inches of the subsoil is reddish brown silt loam and reddish gray, firm silty clay loam. The next 11 inches is reddish gray, very firm and brittle silt loam. The lower 7 inches is reddish gray, firm gravelly silt loam. The substratum is mottled, reddish brown gravelly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Bucks, Ungers, Mount Lucas, and Readington soils. Also included is a soil in which the subsoil is friable throughout, small areas of soils that have stones on the surface, and poorly drained soils. Inclusions make up about 15 percent of the unit.



The permeability of this Abbottstown soil is slow in the subsoil and substratum, and available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 6 to 18 inches. Reaction is very strongly acid to neutral in the surface layer and upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum.

Most areas of this soil are in cropland and pasture. A few small areas are wooded.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, strip cropping, using cover crops, and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: Illw; woodland ordination symbol: 3w.

**AsB—Abbottstown extremely stony silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and somewhat poorly drained. It is in depressions and drainageways. Slopes are broad and concave and are mainly less than 600 feet in length. The areas of the soil are irregular in shape and range from 5 to 20 acres. Stones and boulders 1 foot to 3 feet in diameter cover 15 to 50 percent of the surface.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is mottled and is 32 inches thick. The upper 14 inches of the subsoil is reddish brown silt loam and reddish gray, firm silty clay loam. The next 11 inches is reddish gray, very firm and brittle silt loam. The lower 7 inches is reddish gray, firm gravelly silt loam. The substratum is mottled, reddish brown gravelly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Bucks, Mount Lucas, and Readington soils. Also included are small areas of a soil in which the subsoil is friable throughout, poorly drained soils, soils with slopes of more than 8 percent, and soils where stones cover

less than 15 percent of the surface. Inclusions make up about 15 percent of the unit.

The permeability of this Abbottstown soil is slow in the subsoil and substratum, and available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 6 to 18 inches. Reaction is very strongly acid to neutral in the surface layer and upper part of the subsoil and strongly acid to neutral in the lower part of the subsoil and in the substratum.

Most areas of this soil are wooded. A few small areas are used for pasture and nonfarm uses.

The stones on the surface make this soil generally unsuitable for farming. The soil is suited to trees. Potential productivity is moderately high. The seasonal high water table and the stones on the surface limit harvesting and mechanical planting. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: Vlls; woodland ordination symbol: 3x.

**Ba—Baile silt loam.** This soil is nearly level and gently sloping, deep, and poorly drained. It is in depressions and drainageways. Slopes are broad and concave and are mainly 300 to 500 feet. The areas of this soil are irregular in shape and range from 3 to 50 acres. Slopes range from 0 to 5 percent.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is mottled and is 30 inches thick. It is light brownish gray silt loam and silty clay loam in the upper 10 inches and grayish brown, firm silty clay loam and silt loam in the lower 20 inches. The substratum is gray loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Glenville, Chester, and Glenelg soils that make up about 15 percent of the unit.

The permeability of this Baile soil is slow in the subsoil and substratum, and the available water capacity is high. Runoff is slow. This soil has a seasonal high water table between the surface and a depth of 6 inches. Reaction is medium acid to neutral throughout.

Most areas of this soil are in pasture. A few areas are in woodland.

This soil is suited to cultivated crops, but the seasonal high water table restricts root growth. Excess surface water can be drained by keeping natural drainageways open and by using subsurface drains where outlets are available. Conservation tillage will help to reduce runoff and erosion.

This soil is suited to pasture, especially to water-tolerant grasses and legumes. Grazing during wet periods causes soil compaction and plant damage. The



use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is very high. The high water table interferes with the use of equipment for harvesting and maintenance. Seedling mortality is high.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: Vw; woodland ordination symbol: 1w.

**BdA—Bedington silt loam, 0 to 3 percent slopes.**

This soil is nearly level, deep, and well drained. It is on ridgetops. Slopes are smooth and are mainly less than 500 feet in length. The areas of this soil are irregular in shape and range from 3 to 300 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The subsoil is 51 inches thick. It is strong brown channery silt loam in the upper 23 inches and yellowish red and yellowish brown very channery loam in the lower 28 inches. The substratum is yellowish brown extremely channery silt loam to a depth of at least 77 inches.

Included with this soil in mapping are small areas of Blairton, Clymer, Duffield, and Hagerstown soils. Also included are soils similar to this Bedington soil but that have less clay in the subsoil, soils that have bedrock at a depth of 40 inches, and Bedington soils that have a flaggy or gravelly surface layer. Included soils make up about 25 percent of the unit.

The permeability of this Bedington soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are in cropland and pasture. Some small areas are used for homesites and woodland.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability of the soil and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for some types of community development, especially for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 2o.

**BdB—Bedington silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and well drained. It is on

ridgetops and side slopes. Slopes are convex and are mainly less than 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 550 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The subsoil is 51 inches thick. It is strong brown channery silt loam in the upper 23 inches and yellowish red and yellowish brown very channery loam in the lower 28 inches. The substratum is yellowish brown extremely channery silt loam to a depth of at least 77 inches.

Included with this soil in mapping are small areas of Blairton, Clymer, Duffield, and Hagerstown soils. Also included are soils similar to this Bedington soil but that have less clay in the subsoil, soils that have bedrock at a depth of 40 inches, and Bedington soils that have a channery surface layer. The included soils make up about 25 percent of the unit.

The permeability of this Bedington soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are in cropland and pasture (fig. 6). Some small areas are used for homesites and woodland.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability of the soil and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for some types of community development, especially for septic tank absorption fields.

Capability subclass: Ilc; woodland ordination symbol: 2o.

**BdC—Bedington silt loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on ridgetops and side slopes. Slopes are convex and are mainly less than 300 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The subsoil is 51 inches thick. It is strong brown channery silt loam in the upper 23 inches and yellowish red and yellowish brown very channery loam in the lower 28 inches. The substratum is





Figure 6.—An area of Bedington silt loam, 3 to 8 percent slopes, in the foreground.

yellowish brown extremely channery silt loam to a depth of at least 77 inches.

Included with this soil in mapping are small areas of Blairton, Clymer, Duffield, and Hagerstown soils. Also included are soils similar to this Bedington soil but that have less clay in the subsoil, soils that have bedrock at a depth of 40 inches, and Bedington soils that have a flaggy or gravelly surface layer. Included soils make up about 30 percent of the unit.

The permeability of this Bedington soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are cultivated. Some areas are used for homesites and trees.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 2o.

**BeD—Bedington channery silt loam, 15 to 25 percent slopes.** This soil is moderately steep, deep, and well drained. It is on ridgetops and side slopes. Slopes are convex and are mainly less than 300 feet in length. The areas of the soil are oval and range from 3 to 300 acres.

Typically, the surface layer is dark yellowish brown channery silt loam about 9 inches thick. The subsoil is



51 inches thick. It is strong brown channery silt loam in the upper 23 inches and yellowish red and yellowish brown very channery loam in the lower 28 inches. The substratum is yellowish brown extremely channery silt loam to a depth of at least 77 inches.

Included with this soil in mapping are small areas of Clymer and Hagerstown soils. Also included are soils similar to this Bedington soil but that have less clay in the subsoil, soils that have bedrock at a depth of 40 inches, and soils with a surface layer of flaggy silt loam or with slopes of more than 25 percent. The included soils make up about 30 percent of the unit.

The permeability of this Bedington soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is rapid. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are wooded or are used for homesites.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 2r.

**Bm—Blairton silt loam, 3 to 10 percent slopes.** This soil is gently sloping, moderately deep, and moderately well drained and somewhat poorly drained. It is on concave side slopes and in drainageways. Slopes are 100 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is 25 inches thick. It is brown silt loam in the upper 8 inches; mottled, pale brown silty clay loam in the next 9 inches; and mottled, light brownish gray, firm channery silt loam in the lower 8 inches. The substratum is mottled, light brownish gray very channery loam 4 inches thick. Brown shale bedrock is at a depth of 39 inches.

Included with this soil in mapping are small areas of Bedington, Bucks, and Ungers soils. Also included are areas of a soil that has a very firm and brittle layer in the subsoil, a soil that is more than 40 inches deep to

bedrock, a soil that is less than 20 inches deep to bedrock, and a poorly drained soil. The included soils make up about 30 percent of the unit.

The permeability of this Blairton soil is moderately slow in the subsoil, and the available water capacity is moderate. Runoff is medium. Reaction is very strongly acid to neutral throughout. This soil has a seasonal high water table at a depth of 1/2 foot to 3 feet.

Most areas of this soil are farmed. A few small areas are in woodland.

This soil is suited to cultivated crops. The seasonal high water table interferes with timely tillage and planting. Subsurface drainage removes excess water where suitable outlets are available and improves suitability for some crops. Stripcropping, conservation tillage, and the use of grassed waterways help to control runoff and reduce erosion. Using grasses and legumes in the crop rotation helps to maintain organic matter and improves tilth.

This soil is suited to pasture. Grazing when the soil is wet causes surface compaction, increases runoff, and damages plants. The use of proper stocking rates, rotational grazing, and deferred grazing during wet periods are practices that maintain tilth and desirable plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table interferes with the use of harvesting equipment.

The seasonal high water table, the moderately slow permeability, and the depth to bedrock are the main limitations of the soil for community development, especially for septic tank absorption fields and homesites.

Capability subclass: IIIw; woodland ordination symbol: 3w.

**Bo—Bowmansville silt loam.** This soil is nearly level, deep, and poorly drained and somewhat poorly drained. It is on flood plains of larger streams. The areas of the soil are long and narrow and range from 3 to 600 acres. They are subject to frequent flooding. Slopes range from 0 to 3 percent.

Typically, the surface layer is reddish brown silt loam about 7 inches thick. The subsoil is mottled, reddish brown and pinkish gray, firm silt loam 28 inches thick. The substratum extends to a depth of 66 inches or more. It is pinkish gray sandy loam in the upper 17 inches and variegated pinkish gray and strong brown stratified sand and gravel in the lower part.

Included with this soil in mapping are small areas of Holly and Rowland soils. Also included are small areas of soils similar to this Bowmansville soil but that have stratified sand and gravel at a depth of 40 inches, soils that have a subsoil of silty clay loam and silty clay, and very stony and extremely stony soils. The included soils make up about 15 percent of the unit.



The permeability of this Bowmansville soil is moderately slow in the subsoil, and the available water capacity is high. The seasonal high water table is between the surface and a depth of 1 1/2 feet. Runoff is slow. Reaction ranges from strongly acid to neutral throughout.

Most areas of this soil are in pasture or are wooded.

This soil is suited to cultivated crops, but the seasonal high water table and flooding limit timely cultivation and planting. Where suitable outlets are available, subsurface drains will help to remove excess water and improve the suitability for crops. Conservation tillage and the use of cover crops will help to protect the soil from erosion by flooding.

The soil is suited to pasture. The use of proper stocking rates, rotational grazing, and deferred grazing during wet periods are practices that help to maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is very high. Flooding interferes with harvesting, but machine planting is practical on larger areas.

Flooding, the moderately slow permeability, and the seasonal high water table are the main limitations of the soil for community development.

Capability subclass: IIIw; woodland ordination symbol: 1w.

**BrB—Brecknock gravelly silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on convex side slopes and on ridgetops. Slopes are 100 to 500 feet long. The areas of the soil are irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 8 inches thick. The subsoil is 30 inches thick. It is dark grayish brown gravelly silt loam in the upper 10 inches, dark grayish brown gravelly silty clay loam in the next 12 inches, and grayish brown, firm gravelly silt loam in the lower 8 inches. The substratum is dark gray very gravelly loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 56 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Mount Lucas, and Lehigh soils. Also included are areas of a soil similar to this Brecknock soil but that has bedrock at a depth of more than 60 inches or that has a very channery surface layer. The included soils make up about 25 percent of the unit.

The permeability of this Brecknock soil is moderate in the subsoil and substratum, and the available water capacity is moderate. Runoff is medium. Reaction is very strongly acid to medium acid throughout.

Most areas of this soil are farmed. A few small areas are wooded.

This soil is suited to cultivated crops. A moderate hazard of erosion is the main management concern. Stripcropping, conservation tillage, and the use of cover crops, crop residue, grassed waterways, and diversions

are practices that help to control runoff and reduce erosion.

This soil is suited to pasture. Rotational grazing and using proper stocking rates are practices that help to maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability and the depth to bedrock are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 3o.

**BrC—Brecknock gravelly silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on concave upland side slopes and ridgetops. Slopes are 100 to 500 feet long. The areas of the soil are irregular in shape and range from 3 to 25 acres.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 8 inches thick. The subsoil is 30 inches thick. It is dark grayish brown gravelly silt loam in the upper 10 inches, dark grayish brown gravelly silty clay loam in the next 12 inches, and grayish brown, firm gravelly silt loam in the lower 8 inches. The substratum is dark gray very gravelly loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 56 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Mount Lucas, and Lehigh soils. Also included are areas of a soil similar to this Brecknock soil but that has bedrock at a depth of more than 60 inches or that has a very channery surface layer. The included soils make up about 25 percent of the unit.

The permeability of this Brecknock soil is moderate in the subsoil and substratum, and the available water capacity is moderate. Runoff is medium. Reaction is very strongly acid to medium acid throughout.

Most areas of this soil are farmed. A few small areas are wooded.

This soil is suited to cultivated crops. A severe hazard of erosion is the major management concern.

Stripcropping, conservation tillage, the use of crop residue, grassed waterways, diversion terraces, and the use of crop rotations that include grasses and legumes and cover crops as part of the cropping system are practices that help to control runoff and reduce erosion. Incorporating crop residue and animal manure into the soil increases the organic matter content and improves or helps to maintain tilth.

This soil is suited to pasture. Rotational grazing and using proper stocking rates are practices that help to maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Runoff can be controlled and erosion reduced by constructing access roads on the contour. Machine planting is practical on large areas.

The permeability, the slope, and the depth to bedrock are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 3o.

**BsB—Brecknock very stony silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on convex side slopes and on ridgetops. Slopes are 100 to 1,000 feet long. The areas of the soil are irregular in shape and range from 5 to 60 acres. Stones and boulders 1 foot to 3 feet in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 2 inches thick. The subsurface layer is dark gray gravelly silt loam 6 inches thick. The subsoil is 30 inches thick. It is dark grayish brown gravelly silt loam in the upper 10 inches, dark grayish brown gravelly silty clay loam in the next 12 inches, and grayish brown gravelly silt loam in the lower 8 inches. The substratum is dark gray very gravelly loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 56 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Mount Lucas, and Lehigh soils. Also included are areas of a soil similar to this Brecknock soil but that has bedrock at a depth of more than 60 inches. The included soils make up about 20 percent of the unit.

The permeability of this Brecknock soil is moderate in the subsoil and substratum, and the available water capacity is moderate. Runoff is medium. Reaction is very strongly acid to medium acid throughout.

The stones on the surface make the use of most types of farm machinery impractical and make the soil generally unsuitable for farming.

This soil is suited to trees, and most areas are wooded. Potential productivity is high. The stones on the surface hinder the use of some types of harvesting equipment and make planting of seedlings by machine impractical.

The permeability and the depth to bedrock are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 3o.

**BsC—Brecknock very stony silt loam, 8 to 25 percent slopes.** This soil is sloping and moderately steep, deep, and well drained. It is on convex upland side slopes of ridges. Slopes are 100 to 500 feet long. The areas of the soil are irregular in shape and range from 3 to 50 acres. Stones and boulders 1 foot to 3 feet in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 2 inches thick. The subsurface

layer is dark gray gravelly silt loam 6 inches thick. The subsoil is 30 inches thick. It is dark grayish brown gravelly silt loam in the upper 10 inches, dark grayish brown gravelly silty clay loam in the next 12 inches, and grayish brown gravelly silt loam in the lower 8 inches. The substratum is dark gray very gravelly loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 56 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Mount Lucas, and Lehigh soils. Also included are areas of a soil similar to this Brecknock soil but that has bedrock at a depth of more than 60 inches. The included soils make up about 20 percent of the unit.

The permeability of this Brecknock soil is moderate in the subsoil and substratum, and the available water capacity is moderate. Runoff is medium to rapid. Reaction is very strongly acid to medium acid throughout.

The stones on the surface make the use of most types of farm machinery impractical and make the soil generally unsuitable for farming.

This soil is suited to tree production, and most areas are wooded. Potential productivity is high. The stones on the surface hinder the use of some types of harvesting equipment and make planting of seedlings by machine impractical. Placing access roads on the contour helps to control runoff and reduce a severe erosion hazard.

The permeability, the slope, and the depth to bedrock are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 3r.

**BuA—Bucks silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are smooth and are 300 to 600 feet in length. The areas of the soil are long and narrow and range from 3 to 25 acres.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is 34 inches thick. It is weak red and red, friable and firm silty clay loam in the upper 24 inches and weak red, friable gravelly silty clay loam in the lower 10 inches. The substratum is weak red gravelly silty clay loam 12 inches thick. Weak red siltstone bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Ungers, Lansdale, Lehigh, and Readington soils and Urban land. Also included are small areas of soils that have more clay in the subsoil than this Bucks soil. The included areas make up about 20 percent of the unit.

The permeability of this Bucks soil is moderate or moderately slow in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to medium acid throughout.



Most areas of this soil are used for cultivated crops. Some small areas are in woodland or used for homesites.

This soil is suited to cultivated crops. Conservation tillage will help to reduce erosion. Using cover crops and crop residue helps to maintain organic matter content and improve tilth.

This soil is suited to pasture. The use of proper stocking rates and rotational grazing are practices that maintain desirable plant species.

[This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on large areas.

The permeability of the soil and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for some types of community development, especially for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 3o.

**BuB—Bucks silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are 300 to 800 feet in length. The areas of the soil are long and narrow and range from 3 to 400 acres.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is 34 inches thick. It is weak red and red, friable and firm silty clay loam in the upper 24 inches and weak red, friable gravelly silty clay loam in the lower 10 inches. The substratum is weak red gravelly silty clay loam 12 inches thick. Weak red siltstone bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Ungers, Clymer, Lansdale, and Readington soils and Urban land. Also included are a few areas of soils similar to this Bucks soil but that are shallower to bedrock or that have more clay in the subsoil. The included areas make up about 20 percent of the unit.

The permeability of this Bucks soil is moderate or moderately slow in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to medium acid throughout.

Most areas of this soil are used for cultivated crops. Some areas are in pasture and woodland, and a few small areas are used for homesites.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing

are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on larger areas.

The permeability of the soil and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for some types of community development, especially for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 3o.

**BuC—Bucks silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and mainly are 300 to 500 feet in length. The areas of the soil are long and narrow or irregular in shape and range from 3 to 600 acres.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is 34 inches thick. It is weak red and red, friable and firm silty clay loam in the upper 24 inches and weak red, friable gravelly silty clay loam in the lower 10 inches. The substratum is weak red gravelly silty clay loam 12 inches thick. Weak red siltstone bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Ungers, Lansdale, and Clymer soils and Urban land and rock outcrops. Also included are a few areas of soils similar to this Bucks soil but that are shallower to bedrock or that have more clay in the subsoil. The included areas make up about 15 percent of the unit.

The permeability of this Bucks soil is moderate or moderately slow in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to medium acid throughout.

Most areas of this soil are used for cultivated crops. Some areas are used for homesites or trees.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on larger areas.

Slope and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the



main limitations for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIle; woodland ordination symbol: 3o.

**BuD—Bucks silt loam, 15 to 25 percent slopes.**

This soil is moderately steep, deep, and well drained. It is on side slopes of ridges. Slopes are convex and are mainly 300 feet in length. The areas of the soil are oval and range from 3 to 50 acres.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is 34 inches thick. It is weak red and red, friable and firm silty clay loam in the upper 24 inches and weak red, friable gravelly silty clay loam in the lower 10 inches. The substratum is weak red gravelly silty clay loam 12 inches thick. Weak red siltstone bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Ungers, Lansdale, and Clymer soils and Urban land and rock outcrops. Also included are a few areas of soils similar to this Bucks soil but that are shallower to bedrock or that have more clay in the subsoil. The included areas make up about 20 percent of the unit.

The permeability of this Bucks soil is moderate or moderately slow in the subsoil and substratum, and the available water capacity is high. Runoff is rapid. Reaction is very strongly acid to medium acid throughout.

Most areas of this soil are cultivated or used for hay and pasture.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 3r.

**BxC—Bucks very stony silt loam, 8 to 25 percent slopes.** This soil is sloping and moderately steep, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are mainly 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 50 acres. Stones and boulders 1 foot to 3 feet in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is 34 inches thick. It is weak red and red, friable and firm silty clay loam in the upper 24 inches and weak red, friable gravelly silty clay loam in the lower 10 inches. The substratum is weak red gravelly silty clay loam 12 inches thick. Weak red siltstone bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Abbottstown, Readington, and Ungers soils. Also included are a few small areas of Bucks soils where stones and boulders cover as much as 40 percent of the surface. The included soils make up about 20 percent of the unit.

The permeability of this Bucks soil is moderate or moderately slow in the subsoil and substratum, and the available water capacity is high. Runoff is medium to rapid. Reaction is very strongly acid to medium acid throughout.

Most areas of these soils are wooded. Some areas are used for homesites.

The stones on the surface make the use of most types of farm machinery impractical and make the soil generally unsuitable for farming.

The soil is suited to trees. Potential productivity is moderately high. Slope limits the selection and use of equipment. The hazard of erosion during harvesting can be reduced by constructing access roads on the contour.

Slope and the permeability are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IVs; woodland ordination symbol: 3o.

**CbA—Chester silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. It is on broad ridgetops. Slopes are 100 to 500 feet in length. The areas of the soil are long and narrow and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsoil is 33 inches thick. It is strong brown silt loam in the upper 4 inches, yellowish red silty clay loam in the next 25 inches, and dark brown, firm silt loam in the lower 4 inches. The substratum is variegated dark brown and strong brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Glenelg, Glenville, Manor, Clymer, and Baile soils and Urban land. Also included are small areas of soils that are similar to this Chester soil but that have a redder subsoil and that are sandy loam, sandy clay loam, or silty clay. Some areas consist of Chester soils that have a gravelly surface layer. The included areas make up about 25 percent of the unit.

The permeability of this Chester soil is moderate in the subsoil and substratum, and available water capacity is high. Runoff is medium. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. Some areas are in woodland.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on larger areas.

The permeability limits the soil as a site for septic tank absorption fields and is the main limitation for community development.

Capability class: I; woodland ordination symbol: 2o.

**CbB—Chester silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad ridgetops. Slopes range from 100 to 600 feet in length. The areas of the soil are irregular in shape and range from 10 to 800 acres.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsoil is 33 inches thick. It is strong brown silt loam in the upper 4 inches, yellowish red silty clay loam in the next 25 inches, and dark brown, firm silt loam in the lower 4 inches. The substratum is variegated dark brown and strong brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Glenelg, Glenville, Manor, Clymer, Duffield, and Baile soils and Urban land. Also included are small areas of soils that are similar to this Chester soil but that have a redder subsoil and that are sandy loam, sandy clay loam, or silty clay. Some areas consist of Chester soils that have a gravelly surface layer. The included areas make up about 25 percent of the unit.

The permeability of this Chester soil is moderate in the subsoil and substratum, and available water capacity is high. Runoff is medium. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability limits the soil as a site for septic tank absorption fields and is the main limitation for community development.

Capability subclass: IIe; woodland ordination symbol: 2o.

**CbC—Chester silt loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are 100 to 400 feet in length. The areas of the soil are long and narrow and range from 5 to 100 acres.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsoil is 33 inches thick. It is strong brown silt loam in the upper 4 inches, yellowish red silty clay loam in the next 25 inches, and dark brown, firm silt loam in the lower 4 inches. The substratum is variegated dark brown and strong brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Glenelg, Glenville, Manor, Clymer, Duffield, and Hagerstown soils and Urban land. Also included are small areas of soils that are similar to this Chester soil but that have a redder subsoil and that are sandy loam, sandy clay loam, or silty clay. Some areas consist of Chester soils that have a gravelly surface layer. The included areas make up about 30 percent of the unit.

The permeability of this Chester soil is moderate in the subsoil and substratum, and available water capacity is high. Runoff is medium. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. Some areas are used for woodland and homesites.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the permeability are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 2o.

**CkA—Clarksburg silt loam, 0 to 5 percent slopes.**

This soil is nearly level, deep, and moderately well drained. It is in depressions and broad drainageways. Slopes are slightly concave and generally are more than



500 feet in length. The areas of the soil are irregular in shape and range from 3 to 175 acres.

Typically, the surface layer is dark grayish brown silt loam 9 inches thick. The subsoil is yellowish brown silty clay loam 43 inches thick. It is firm in the upper 13 inches and is mottled and very firm and brittle in the lower 30 inches. The substratum is mottled, strong brown gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Hagerstown, Duffield, Lindside, and Nolin soils. Also included are areas of soils similar to this Clarksburg soil but that have a surface layer of gravelly silt loam or a surface layer 1 to 3 feet thick. The included soils make up about 15 percent of the unit.

The permeability of this Clarksburg soil is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. The available water capacity is moderate. The seasonal high water table is perched at a depth of 18 to 36 inches. Runoff is medium. Reaction is medium acid to mildly alkaline throughout.

Most areas of this soil are cultivated. Some are in pasture and woodland.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, strip cropping, and using cover crops and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The proper use of stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical in large areas.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: IIw; woodland ordination symbol: 2o.

#### **CIB—Clymer very stony loam, 3 to 8 percent**

**slopes.** This soil is gently sloping, deep, and well drained. It is on ridgetops and side slopes. Slopes range from 100 to 800 feet in length. Stones and boulders 1 to 6 feet in diameter cover 3 to 15 percent of the surface area. The areas of the soil are irregular in shape and range from 3 to 500 acres.

Typically, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam 4 inches thick.

The subsoil is 20 inches thick. It is brownish yellow channery sandy loam in the upper 3 inches and brownish yellow and strong brown channery sandy clay loam in the lower 17 inches. The substratum extends to a depth of 60 inches or more. It is yellowish brown very channery loam and light yellowish brown extremely channery sandy loam.

Included with this soil in mapping are small areas of Bedington, Lansdale, and Chester soils. Also included are small areas of soils similar to this Clymer soil but that have a coarser textured subsoil or that are moderately well drained or somewhat poorly drained. The included soils make up about 15 percent of the unit.

The permeability of this Clymer soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is medium. Reaction is extremely acid to strongly acid throughout.

Most areas of this soil are wooded. A few small areas are in nonfarm uses.

The stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is high. Machine planting is practical in large areas.

The stones and boulders on the surface are the main limitation of this soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VI<sub>s</sub>; woodland ordination symbol: 2o.

#### **CID—Clymer very stony loam, 8 to 25 percent**

**slopes.** This soil is sloping and moderately steep, deep, and well drained. It is on ridgetops and side slopes. Stones and boulders 1 to 6 feet in diameter cover 3 to 15 percent of the surface area. Slopes range from 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 230 acres.

Typically, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam 4 inches thick. The subsoil is 20 inches thick. It is brownish yellow channery sandy loam in the upper 3 inches and brownish yellow and strong brown channery sandy clay loam in the lower 17 inches. The substratum extends to a depth of 60 inches or more. It is yellowish brown very channery loam and light yellowish brown extremely channery sandy loam.

Included with this soil in mapping are small areas of Bedington, Lansdale, and Chester soils. Also included are small areas of soils similar to this Clymer soil but that have a coarser textured subsoil or that are moderately well drained or somewhat poorly drained. The included soils make up about 15 percent of the unit.

The permeability of this Clymer soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is medium and rapid. Reaction is extremely acid to strongly acid throughout.



Most areas of this soil are wooded. A few small areas are in nonfarm uses.

The stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is high. Slope limits the selection and use of equipment.

Slope and the stones on the surface are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VIs; woodland ordination symbol: 2r.

**CIF—Clymer very stony loam, 25 to 50 percent slopes.** This soil is steep and very steep, deep, and well drained. It is on ridgetops and side slopes. Slopes range from 200 to 600 feet in length. Stones and boulders 1 to 6 feet in diameter cover 3 to 15 percent of the surface area. The areas of the soil are irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam 4 inches thick. The subsoil is 20 inches thick. It is brownish yellow channery sandy loam in the upper 3 inches and brownish yellow and strong brown channery sandy clay loam in the lower 17 inches. The substratum extends to a depth of 60 inches or more. It is yellowish brown very channery loam and light yellowish brown extremely channery sandy loam.

Included with this soil in mapping are small areas of Bedington and Chester soils. Also included are small areas of soils similar to this Clymer soil but that have a coarser textured subsoil. The included soils make up about 15 percent of the unit.

The permeability of this Clymer soil is moderate in the subsoil and substratum, and the available water capacity is moderate to high. Runoff is very rapid. Reaction is extremely acid to strongly acid throughout.

Slope and the stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and most areas are wooded. Potential productivity is high. Slope limits the selection and use of equipment.

Slope and the stones and boulders on the surface are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 2r.

**Cm—Comus silt loam.** This soil is nearly level, deep, and well drained. It is on flood plains. Slopes are 100 to 300 feet in length. The areas of the soil are long and narrow or irregular in shape and range from 3 to 200 acres. They are occasionally flooded. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 12 inches thick. The subsoil is dark yellowish brown and yellowish brown silt loam 27 inches thick. The substratum is pale brown loam and pale brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Newark and Holly soils. Also included are areas of soils similar to this Comus soil but that have a dark layer at a depth of 24 to 40 inches or that have more sand in the subsoil. The included soils make up about 15 percent of the unit.

The permeability of this Comus soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction is strongly acid to slightly acid throughout.

This soil is suited to cultivated crops. Flooding in some years delays tillage and planting and damages crops. The use of cover crops will reduce flood damage, and conservation tillage will help to reduce erosion.

This soil is suited to pasture, and most areas are in pasture. Rotational grazing, the use of proper stocking rates, and deferred grazing during wet periods are practices that help to maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is very high. The soil is suited to mechanical planting, but flooding occasionally delays harvesting.

Flooding is the main limitation of the soil for community development, especially as a site for homes, roads, and septic tank absorption fields.

Capability class: I; woodland ordination symbol: 1o.

**CnA—Conestoga silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are slightly convex, and most are less than 1,000 feet in length. The areas of the soil are broad and irregular in shape and range from 3 to 250 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is yellowish brown silt loam and silty clay loam 28 inches thick. The substratum is variegated yellowish brown and light olive brown channery loam to a depth of at least 75 inches.

Included with this soil in mapping are small areas of Hollinger, Letort, Clarksburg, Penlaw, Duffield, and Pequea soils. Also included are small areas of soils that have a redder subsoil than this Conestoga soil or a subsoil of clay or silty clay. Included areas make up about 10 percent of the unit.

The permeability of this Conestoga soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction is strongly acid to mildly alkaline throughout.

Most areas of this soil are in cropland. A few small areas are in nonfarm uses.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 10.

#### **CnB—Conestoga silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and well drained. It is on ridgetops and side slopes. Slopes are convex, and most are less than 500 feet in length. The areas of the soil are broad and irregularly shaped and range from 3 to 550 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is yellowish brown silt loam and silty clay loam 28 inches thick. The substratum is variegated yellowish brown and light olive brown channery loam to a depth of at least 75 inches.

Included with this soil in mapping are small areas of Hollinger, Letort, Clarksburg, Penlaw, Duffield, and Pequea soils. Also included are small areas of soils that have a redder subsoil than this Conestoga soil or a subsoil of clay or silty clay. Included areas make up about 10 percent of the unit.

The permeability of this Conestoga soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is strongly acid to mildly alkaline throughout.

Most areas of this soil are farmed. A few small areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 10.

#### **CnC—Conestoga silt loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are 300 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is yellowish brown silt loam and silty clay loam 28 inches thick. The substratum is variegated yellowish brown and light olive brown channery loam to a depth of at least 75 inches.

Included with this soil in mapping are small areas of Hollinger, Letort, Clarksburg, Duffield, and Pequea soils. Also included are small areas of soils that have a redder subsoil than this Conestoga soil or a subsoil of clay or silty clay. Included areas make up about 10 percent of the unit.

The permeability of this Conestoga soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is strongly acid to mildly alkaline throughout.

Most areas of this soil are farmed. A few small areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the permeability of the soil are the main limitations for community development.

Capability subclass: IIIe; woodland ordination symbol: 10.

**DbA—Duffield silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. It is on broad convex slopes that are mainly less than 1,000 feet long. The areas of the soil are oval or irregular in shape and range from 5 to 800 acres.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsoil is silty clay loam to a depth of 60 inches or more. It is dark yellowish brown and yellowish brown and friable and firm to a depth of 30 inches and is strong brown and firm at a depth of more than 30 inches.

Included with this soil in mapping are small areas of rock outcrop and areas with a surface layer of silty clay loam or gravelly silt loam. Also included are areas of Hagerstown, Clarksburg, Bedington, Conestoga, Chester,



Lindside, and Nolin soils and a few areas of Urban land. Inclusions make up about 25 percent of the unit.

The permeability of this Duffield soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is medium acid to neutral throughout.

Most areas of this soil are used for cultivated crops or are in nonfarm uses. Some small areas are in pasture or woodland.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

A shrink-swell potential and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations of the soil for community development. The depth to bedrock is a limitation for septic tank absorption fields, and the shrink-swell potential is a limitation for homesites.

Capability class: I; woodland ordination symbol: 1o.

**DbB—Duffield silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad, convex slopes. The areas of the soil are oval or irregular in shape and range from 5 to 1,000 acres.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsoil is silty clay loam to a depth of 60 inches or more. It is dark yellowish brown and yellowish brown and friable and firm to a depth of 30 inches and is strong brown and firm at a depth of more than 30 inches.

Included with this soil in mapping are small areas of rock outcrop, areas with slopes of more than 8 percent, and areas with a surface layer of silty clay loam or gravelly silt loam. Also included are areas of Hagerstown, Clarksburg, Bedington, Conestoga, Chester, Lindside, and Nolin soils and a few small areas of Urban land. Inclusions make up about 25 percent of the unit.

The permeability of this Duffield soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is medium acid to neutral throughout.

Most areas of this soil are used for cultivated crops or are in nonfarm uses. Some small areas are in pasture or woodland.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping

system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

A shrink-swell potential and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations of the soil for community development. The depth to bedrock is a limitation for septic tank absorption fields, and the shrink-swell potential is a limitation for homesites.

Capability subclass: IIe; woodland ordination symbol: 1o.

**EcA—Elk silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. Slopes are mainly less than 1,000 feet long. It is on stream terraces. The areas of the soil are irregular in shape and range from 3 to 350 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish brown and is 38 inches thick. It is silt loam and silty clay loam. The substratum is strong brown silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Hagerstown, Duffield, and Newark soils and Urban land. Also included are areas of moderately well drained soils and soils similar to this Elk soil but that have a redder subsoil or a surface layer of gravelly silt loam. The included areas make up about 20 percent of the unit.

The permeability of this Elk soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction is very strongly acid through neutral throughout.

Most areas of this soil are cultivated. Some large areas are in nonfarm uses.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 2o.

**EcB—Elk silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on stream

terraces. Slopes are convex and are mainly less than 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish brown and is 38 inches thick. It is silt loam and silty clay loam. The substratum is strong brown silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Hagerstown, Duffield, and Newark soils and Urban land. Also included are areas of moderately well drained soils and soils similar to this Elk soil but that have a redder subsoil or a surface layer of gravelly silt loam. The included areas make up about 20 percent of the unit.

The permeability of this Elk soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid through neutral throughout.

Most areas of this soil are farmed. Some large areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2o.

**EcC—Elk silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on stream terraces. Slopes are convex and are mainly less than 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 125 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish brown and is 38 inches thick. It is silt loam and silty clay loam. The substratum is strong brown silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Hagerstown and Duffield soils and Urban land. Also included are soils similar to this Elk soil but that have slopes of more than 15 percent, have a redder subsoil, or are gravelly silt loam throughout. The included areas make up about 25 percent of the unit.

The permeability of this Elk soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid through neutral throughout.

Most areas of this soil are farmed. A few areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the permeability of the soil are the main limitations for community development.

Capability subclass: IIle; woodland ordination symbol: 2o.

**Eu—Elk-Urban land complex.** This unit consists of nearly level and gently sloping, deep, well drained Elk soils and areas covered by houses, roads, sidewalks, parking lots, and other structures. The unit is on high stream terraces. Slopes are smooth. The areas range from 10 to 300 acres. They are about 55 percent Elk soils, 20 percent Urban land, and 25 percent other soils. The Elk soils and Urban land are in such an intricate pattern that it was not practical to map them separately. Slopes range from 0 to 8 percent.

Typically, the surface layer of the Elk soils is brown silt loam about 10 inches thick. The subsoil is 38 inches thick and yellowish brown. It is silt loam and silty clay loam. The substratum is strong brown silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Newark and Lindsides soils on flood plains and Hagerstown and Duffield soils on uplands. Also included are Elk soils that are moderately steep and soils similar to Elk soils but that are moderately well drained and have a surface layer of gravelly silt loam.

The permeability of these Elk soils is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow on the Elk soils, and reaction is very strongly acid to neutral throughout.

The Elk soils are mainly in narrow areas next to or between buildings and other structures or are in vacant lots and fields. Onsite investigation is needed to determine the suitability of the unit for any use.

This unit is not assigned to a capability subclass or woodland ordination group.



**Ff—Fluvaquents and Udifluvents, loamy.** This unit consists of nearly level, moderately deep and deep, well drained to poorly drained soils on flood plains. Some areas consist mostly of Fluvaquents, some mostly of Udifluvents, and some of both intermingled in a complex pattern. The Fluvaquents and Udifluvents were mapped together because they have no major differences in use and management. The total acreage of the unit is about 60 percent Fluvaquents, 25 percent Udifluvents, and 15 percent other soils. The areas of the unit are long and narrow and range from 20 to 150 acres. They are frequently flooded. Slopes range from 0 to 3 percent.

Generally, the Fluvaquents have a surface layer of sandy loam to silt loam, and in some areas it contains coal deposits or large stones. The substratum is mottled, gray sandy loam to silt loam in the upper part and is stratified sand and gravel in the lower part.

Generally, the Udifluvents have a surface layer of sandy loam to silt loam, and in some areas it contains coal deposits or large stones. The substratum is brown loamy sand to silty clay loam and in many areas is stratified sand and gravel in the lower part.

Included with these soils in mapping are small areas of Holly, Newark, Nolin, and Elk soils.

The permeability, available water capacity, and runoff of Fluvaquents and Udifluvents are variable. Reaction is very strongly acid to slightly acid.

Most areas of these soils are covered with sedges, rushes, shrubs, or immature woodland. A few areas are in pasture.

The hazard of flooding and the deposition of debris from flooding make these soils generally unsuitable for farming and are the main limitations for community development. The soils are suitable for trees, but flooding and the debris limit the use of equipment.

This unit is not assigned to a capability subclass or woodland ordination group.

**GbB—Glenelg silt loam, 3 to 8 percent slopes.** This soil is gently sloping and well drained. It is on tops and side slopes of ridges. Slopes are convex and range from 300 to 800 feet in length. The areas of the soil are long and narrow and range from 20 to 300 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 14 inches thick. The substratum is reddish yellow loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Manor, and Glenville soils and Urban land. Also included are small areas of soils similar to this Glenelg soil but that are redder and have a sandy or clayey subsoil or that have a gravelly surface layer. Included areas make up about 25 percent of the unit.

The permeability of this Glenelg soil is moderate in the subsoil and substratum, and the available water capacity

is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability of the soil and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for community development, especially for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2o.

**GbC—Glenelg silt loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on side slopes. Slopes are convex and range from 300 to 700 feet in length. The areas of the soil are long and narrow and range from 10 to 50 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 14 inches thick. The substratum is reddish yellow loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Manor, and Glenville soils and Urban land. Also included are Glenelg soils that have a gravelly surface layer. Included areas make up about 30 percent of the unit.

The permeability of this Glenelg soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

The permeability of the soil, the slope, and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 2o.

**GbD—Glenelg silt loam, 15 to 25 percent slopes.**

This soil is moderately steep and well drained. It is on side slopes of hills and ridges on uplands. Slopes are convex and range from 300 to 600 feet in length. The areas of the soil are long and narrow and range from 10 to 100 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 14 inches thick. The substratum is reddish yellow loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester and Manor soils and Urban land. Also included are small areas of soils similar to this Glenelg soil but that are redder or that have a sandy or clayey subsoil. Included areas make up to about 15 percent of the unit.

The permeability of this Glenelg soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is rapid. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 2r.

**GdB—Glenville silt loam, 3 to 8 percent slopes.**

This soil is gently sloping and moderately well drained and somewhat poorly drained. It is in depressions and drainageways on uplands. The areas are long and

narrow or irregular in shape and range from 3 to 300 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is mottled and is 39 inches thick. It is yellowish brown silt loam in the upper 6 inches; yellowish brown, very firm and slightly brittle silt loam in the next 23 inches; and strong brown silt loam in the lower 10 inches. The substratum is strong brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Baile, Chester, Glenelg, and Manor soils. Also included are areas of nearly level Glenville soils and moderately well drained soils in which the entire subsoil is friable. Included soils make up about 30 percent of the unit.

The permeability of this Glenville soil is moderate in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum. The available water capacity is moderate. Runoff is medium. Reaction is strongly acid to neutral throughout. A seasonal high water table is at a depth of 6 to 36 inches.

Most areas of this soil are cultivated. Some areas are in pasture or woodland.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, stripcropping, using cover crops, and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2w.

**HaA—Hagerstown silt loam, 0 to 3 percent slopes.**

This soil is nearly level, deep, and well drained. It is on low hills and in valleys. Slopes are slightly convex and are 100 to 300 feet in length. The areas of the soil are irregular in shape and range from 3 to 300 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam in the upper 10 inches; red, firm clay in the next 10 inches;



and strong brown silty clay and silty clay loam in the lower part.

Included with this soil in mapping are small areas of Duffield, Conestoga, Chester, Bedington, and Elk soils and Urban land. Also included are small areas of a soil similar to this Hagerstown soil but that is browner in the upper part of the subsoil and is dominantly silty clay loam. A few small areas consist of rock outcrop or soils with a surface layer of gravelly silt loam. Included areas make up about 25 percent of the unit.

The permeability of this Hagerstown soil is moderate in the subsoil, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral in the surface layer and subsoil.

Most areas of this soil are in cropland or nonfarm uses. A few small areas are in pasture or woodland.

This soil is well suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is well suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. The use of equipment is restricted during wet seasons because of the clayey subsoil. Machine planting of seedlings is practical in large areas.

The permeability of the soil and a shrink-swell potential are the main limitations for community development, especially for homesites and septic tank absorption fields. In some areas the depth to bedrock is less than 60 inches and is a further limitation for those uses.

Capability class: I; woodland ordination symbol: 1c.

#### **HaB—Hagerstown silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and well drained. It is on low hills and in valleys. Slopes are undulating and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 2,500 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam in the upper 10 inches; red, firm clay in the next 10 inches; and strong brown silty clay and silty clay loam in the lower part.

Included with this soil in mapping are small areas of Duffield, Conestoga, Chester, Bedington, Elk, and Clarksburg soils and Urban land. Also included are small areas of a soil similar to this Hagerstown soil but that is browner in the upper part of the subsoil and is dominantly silty clay loam. A few small areas consist of rock outcrop or soils with a surface layer of gravelly silt loam. Included areas make up about 30 percent of the unit.

The permeability of this Hagerstown soil is moderate in the subsoil, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral in the surface layer and subsoil.

Most areas of this soil are in cropland or nonfarm uses. A few small areas are in pasture or woodland.

This soil is well suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is well suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is well suited to trees, and potential productivity is very high. The use of equipment is restricted during wet seasons because of the clayey subsoil. Machine planting of seedlings is practical in large areas.

The permeability of the soil and a shrink-swell potential are the main limitations for community development, especially for homesites and septic tank absorption fields. In some areas the depth to bedrock is less than 60 inches and is a further limitation for those uses.

Capability subclass: IIe; woodland ordination symbol: 1c.

#### **HbC—Hagerstown silty clay loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on hillsides. Slopes are 100 to 300 feet in length. The areas of the soil are irregular in shape and range from 2 to 300 acres.

Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam in the upper 10 inches; red, firm clay in the next 10 inches; and strong brown silty clay and silty clay loam in the lower part.

Included with this soil in mapping are small areas of Duffield, Bedington, Elk, and Clarksburg soils and Urban land. Also included are a few areas which have bedrock at a depth of less than 40 inches, areas of rock outcrop, and areas that have a surface layer of silt loam. Included soils make up about 25 percent of the unit.

The permeability of this Hagerstown soil is moderate in the subsoil, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral in the surface layer and subsoil.

Most areas of this soil are farmed or in nonfarm uses. A few small areas are in woodland.

This soil is well suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation

tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is well suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. The high clay content of the soil restricts the use of equipment during wet periods. Machine planting of seedlings is practical in large areas.

Slope, permeability, and a shrink-swell potential are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields. In some areas bedrock is at a depth of less than 60 inches and is a further limitation for those uses.

Capability subclass: IIIe; woodland ordination symbol: 1c.

**HbD—Hagerstown silty clay loam, 15 to 30 percent slopes.** This soil is moderately steep, deep, and well drained. It is on side slopes of hills. Slopes are convex and are 100 to 300 feet in length. The areas of the soil are irregular in shape and range from 2 to 150 acres.

Typically, the surface layer is reddish brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam in the upper 10 inches; red, firm clay in the next 10 inches; and strong brown silty clay and silty clay loam in the lower part.

Included with this soil in mapping are small areas of Duffield, Bedington, Elk, and Clarksburg soils and Urban land. Also included are a few areas which have bedrock at a depth of less than 40 inches, a few areas of rock outcrop, and a few areas with slopes of more than 30 percent. Included soils make up about 25 percent of the unit.

The permeability of this Hagerstown soil is moderate in the subsoil, and the available water capacity is high. Runoff is rapid. Reaction is very strongly acid to neutral in the surface layer and subsoil.

Most areas of this soil are farmed or in nonfarm uses. A few small areas are wooded.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is well suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing

are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. Slope limits the selection and use of harvesting equipment and restricts machine planting. The high clay content in the soil restricts the use of equipment during wet periods. Building access roads on or near the contour reduces erosion.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 1c.

**Hc—Hagerstown-Urban land complex.** This unit consists of nearly level to moderately sloping, well drained soils and areas covered by houses, roads, sidewalks, parking lots, and other structures. The unit is on valley floors and the adjacent hills. The areas range from 10 to 150 acres. They consist of about 50 percent Hagerstown soils, 30 percent Urban land, and 20 percent other soils. The Hagerstown soils and Urban land are in such an intricate pattern that it was not practical to map them separately. Slopes range from 0 to 15 percent.

Typically, the surface layer of the Hagerstown soils is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam in the upper 10 inches; red, firm clay in the next 10 inches; and strong brown silty clay and silty clay loam in the lower part.

Included with this unit in mapping are areas of Duffield, Bedington, and Clarksburg soils. Also included are a few areas of rock outcrop.

The permeability of the Hagerstown soils is moderate in the subsoil. Runoff is medium. Available water capacity is high. Reaction is very strongly acid to neutral in the surface layer and subsoil.

The Hagerstown soils are mainly in narrow areas between or next to buildings and are in vacant lots and fields. Onsite investigation is needed to determine the suitability of the unit for any use.

This unit is not assigned to a capability subclass or woodland ordination group.

**HfA—Hollinger silt loam, 0 to 3 percent slopes.**

This soil is nearly level, deep, and well drained. It is on ridgetops and broad side slopes. Slopes are smooth and slightly convex and are 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 50 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 30 inches thick. The substratum is yellowish brown loam and fine sandy loam to a depth of 60 inches or more.



Included with this soil in mapping are small areas of Pequea, Manor, Duffield, Clarksburg, Letort, and Conestoga soils. Also included are a few areas of a soil similar to this Hollinger soil but in which bedrock is at a depth of 40 to 60 inches. Included areas make up about 20 percent of the unit.

The permeability of this Hollinger soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction ranges from medium acid to neutral in the surface layer and subsoil and from slightly acid to mildly alkaline in the substratum.

Most areas of this soil are farmed. A few small areas are in nonfarm uses.

This soil is suited to cultivated crops. Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 2o.

#### **HfB—Hollinger silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and well drained. It is on broad side slopes. Slopes are convex and are 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 400 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 30 inches thick. The substratum is yellowish brown loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Pequea, Letort, Manor, Duffield, Clarksburg, and Conestoga soils. Also included are small areas of rock outcrop and a soil similar to this Hollinger soil but in which bedrock is at a depth of 40 to 60 inches. Included areas make up about 20 percent of the unit.

The permeability of this Hollinger soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from medium acid to neutral in the surface layer and subsoil and from slightly acid to mildly alkaline in the substratum.

Most areas of this soil are farmed. A few small areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping

system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2o.

#### **HfC—Hollinger silt loam, 8 to 15 percent slopes.**

This soil is sloping, deep, and well drained. It is on side slopes. Slopes are convex and are mainly 300 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 8 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 30 inches thick. The substratum is yellowish brown loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Pequea, Letort, Manor, Duffield, Clarksburg, and Conestoga soils. Also included are small areas of rock outcrop and a soil similar to this Hollinger soil but in which bedrock is at a depth of 40 to 60 inches. Included areas make up about 15 percent of the unit.

The permeability of this Hollinger soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from medium acid to neutral in the surface layer and subsoil and from slightly acid to mildly alkaline in the substratum.

Most areas of this soil are farmed. Some small areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the permeability of the soil are the main limitations for community development.

Capability subclass: IIIe; woodland ordination symbol: 2o.



**HfD—Hollinger silt loam, 15 to 25 percent slopes.**

This soil is moderately steep, deep, and well drained. It is on convex side slopes. Slopes are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is strong brown silt loam 30 inches thick. The substratum is yellowish brown loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Pequea, Manor, Letort, and Conestoga soils. Also included are small areas of rock outcrop and a soil similar to this Hollinger soil but in which bedrock is at a depth of 40 to 60 inches. Included areas make up about 20 percent of the unit.

The permeability of this Hollinger soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is rapid. Reaction ranges from medium acid to neutral in the surface layer and subsoil and from slightly acid to mildly alkaline in the substratum.

Most areas of this soil are farmed.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 2r.

**Hg—Holly silt loam.** This soil is nearly level, deep, and poorly drained. It is on flood plains and is frequently flooded. Slopes are smooth and are 200 to 300 feet in length. The areas of the soil are long and narrow and range from 5 to 50 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam 6 inches thick. The subsurface layer is dark gray silt loam 2 inches thick. The subsoil is mottled and is 19 inches thick. It is light brownish gray silt loam and silty clay loam in the upper 17 inches and gray sandy loam in the lower 2 inches. The substratum extends to a depth of 60 inches or more. It is gray and light gray fine sandy loam, sandy loam, and gravelly sand.

Included with this soil in mapping are small areas of Bowmansville, Rowland, Comus, and Newark soils. Also included are small sand bars and a few small areas that have stones on the surface. Included soils make up about 15 percent of the unit.

The permeability of this Holly soil is moderate to moderately slow in the upper part of the subsoil and moderate to moderately rapid in the lower part of the subsoil and in the substratum. The available water capacity is high. A high water table is between the surface and a depth of 6 inches. Runoff is slow. Reaction is medium acid to neutral throughout.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm use.

This soil is suited to cultivated crops, but the seasonal high water table and flooding limit timely cultivation and planting. Where suitable outlets are available, subsurface drains will help to remove excess water and improve the suitability for crops. Conservation tillage and the use of cover crops will help to protect the soil from erosion by flooding.

This soil is suited to pasture, but water-tolerant grasses and legumes are needed in undrained areas. Grazing when the soil is wet causes surface compaction and damages plants. The use of proper stocking rates, rotational grazing, and deferred grazing during wet periods are practices that help to maintain tilth and desirable plant species.

This soil is suited to trees, and potential productivity is high. Flooding and the high water table will interfere with harvesting and machine planting of seedlings.

Flooding and the high water table are the main limitations of the soil for community development, especially for septic tank absorption fields, homesites, and roads.

Capability subclass: IIIw; woodland ordination symbol: 2w.

**LaB—Lansdale loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on side slopes and tops of hills and ridges. Slopes are 300 to 1,500 feet in length. The areas of the soil are irregular in shape and range from 3 to 170 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil is 26 inches thick. It is yellowish brown and dark yellowish brown sandy loam in the upper 18 inches and yellowish brown sandy clay loam in the lower 8 inches. The substratum is yellowish brown gravelly sandy loam 12 inches thick. Pale brown sandstone bedrock is at a depth of 46 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, and Readington soils. Also included are small areas with stones on the surface. Included soils make up about 15 percent of the unit.

The permeability of this Lansdale soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is moderate to high. Runoff is



medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on large areas.

The depth to bedrock and the permeability of the soil are the main limitations for community development, especially for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 3o.

**LaC—Lansdale loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on side slopes of hills and ridges. Slopes are convex and are mainly 300 to 600 feet in length. The areas of the soil are irregular in shape and range from 3 to 250 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil is 26 inches thick. It is yellowish brown and dark yellowish brown sandy loam in the upper 18 inches and yellowish brown sandy clay loam in the lower 8 inches. The substratum is yellowish brown gravelly sandy loam 12 inches thick. Pale brown sandstone bedrock is at a depth of 46 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, and Readington soils. Also included are small areas with stones on the surface. Included soils make up about 15 percent of the unit.

The permeability of this Lansdale soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is moderate to high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern.

The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on large areas.

Slope, the permeability of the soil, and the depth to bedrock are limitations for septic tank absorption fields. Slope limits the soil as a site for homes.

Capability subclass: IIIe; woodland ordination symbol: 3o.

**LaD—Lansdale loam, 15 to 25 percent slopes.** This soil is moderately steep, deep, and well drained. It is on side slopes of hills and ridges. Slopes are convex and 300 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil is 26 inches thick. It is yellowish brown and dark yellowish brown sandy loam in the upper 18 inches and yellowish brown sandy clay loam in the lower 8 inches. The substratum is yellowish brown gravelly sandy loam 12 inches thick. Pale brown sandstone bedrock is at a depth of 46 inches.

Included with this soil in mapping are small areas of Bucks and Ungers soils. Also included are small areas of soils that are less than 40 inches deep to bedrock, areas with stones on the surface, and areas with slopes of more than 25 percent. The included soils make up about 25 percent of the unit.

The permeability of this Lansdale soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is moderate to high. Runoff is rapid. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope, the permeability of the soil, and the depth to bedrock are limitations for septic tank absorption fields. Slope limits the soil as a site for homes.

Capability subclass: IVe; woodland ordination symbol: 3r.



**LbB—Lehigh silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and moderately well drained and somewhat poorly drained. It is at heads of drainageways and on middle and lower slopes. Slopes are smooth and slightly concave and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is 33 inches thick. The upper 9 inches is dark brown, friable channery silty clay loam. The middle 16 inches is mottled, dark gray, firm channery silty clay loam. The lower 8 inches is mottled, very dark gray, firm channery silt loam. The substratum is dark gray very channery silty clay loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 58 inches.

Included with this soil in mapping are small areas of Brecknock, Lansdale, Bucks, and Readington soils. Also included are small areas with stones on the surface and areas of a soil similar to this Lehigh soil but that is more than 60 inches deep to bedrock. Included soils make up about 35 percent of the unit.

The permeability of this Lehigh soil is slow in the subsoil and substratum. The available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 6 to 18 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, stripcropping, using cover crops, and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: llw; woodland ordination symbol: 3w.

**LbC—Lehigh silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and moderately well drained and

somewhat poorly drained. It is along heads of drainageways and on middle and lower slopes. Slopes are smooth and slightly concave and are 100 to 300 feet in length. The areas are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is 33 inches thick. The upper 9 inches is dark brown, friable channery silty clay loam. The middle 16 inches is mottled, dark gray, firm channery silty clay loam. The lower 8 inches is mottled, very dark gray, firm channery silt loam. The substratum is dark gray very channery silty clay loam 18 inches thick. Very dark gray porcelanite bedrock is at a depth of 58 inches.

Included with this soil in mapping are small areas of Brecknock, Penn, and Bucks soils. Also included are small areas with stones on the surface, soils similar to this Lehigh soil but that are 40 to 60 inches deep to bedrock, and soils that are more than 60 inches deep to bedrock. Included soils make up about 25 percent of the unit.

The permeability of this Lehigh soil is slow in the subsoil and substratum. The available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 6 to 18 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but the hazard of erosion is severe and the seasonal high water table restricts timely tillage and planting. Subsurface drainage where suitable outlets are available will improve the suitability for some crops. The use of cover crops, conservation tillage, diversion terraces, stripcropping, and the use of grassed waterways are practices that help to control runoff and reduce erosion. Incorporating crop residue and manure into the surface layer helps to improve and maintain soil tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability of the soil, the seasonal high water table, and slope are the main limitations for community development. All three are limitations for septic tank absorption fields, and the seasonal high water table is a limitation of the soil as a site for buildings with basements.



Capability subclass: IIIe; woodland ordination symbol: 3w.

**LdA—Letort silt loam, 0 to 3 percent slopes.** This soil is nearly level, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are slightly convex and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 25 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction ranges from strongly acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are in cropland. A few areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops: Conservation tillage and using cover crops and crop residue are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability class: I; woodland ordination symbol: 2o.

**LdB—Letort silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are 100 to 1,000 feet in length. The areas of the soil are irregular in shape and range from 3 to 2,000 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 15 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from strongly

acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are farmed. A few areas are in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2o.

**LdC—Letort silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on broad ridgetops and side slopes. Slopes are convex and are 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is dark grayish brown silt loam 23 inches thick. The substratum is very dark grayish brown silt loam and channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Manor, Hollinger, Conestoga, Clarksburg, and Pequea soils. Included areas make up about 15 percent of the unit.

The permeability of this Letort soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction ranges from strongly acid to neutral in the surface layer and subsoil and from medium acid to mildly alkaline in the substratum.

Most areas of this soil are in cropland. A few areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees; and potential productivity is high. Machine planting is practical on large areas.



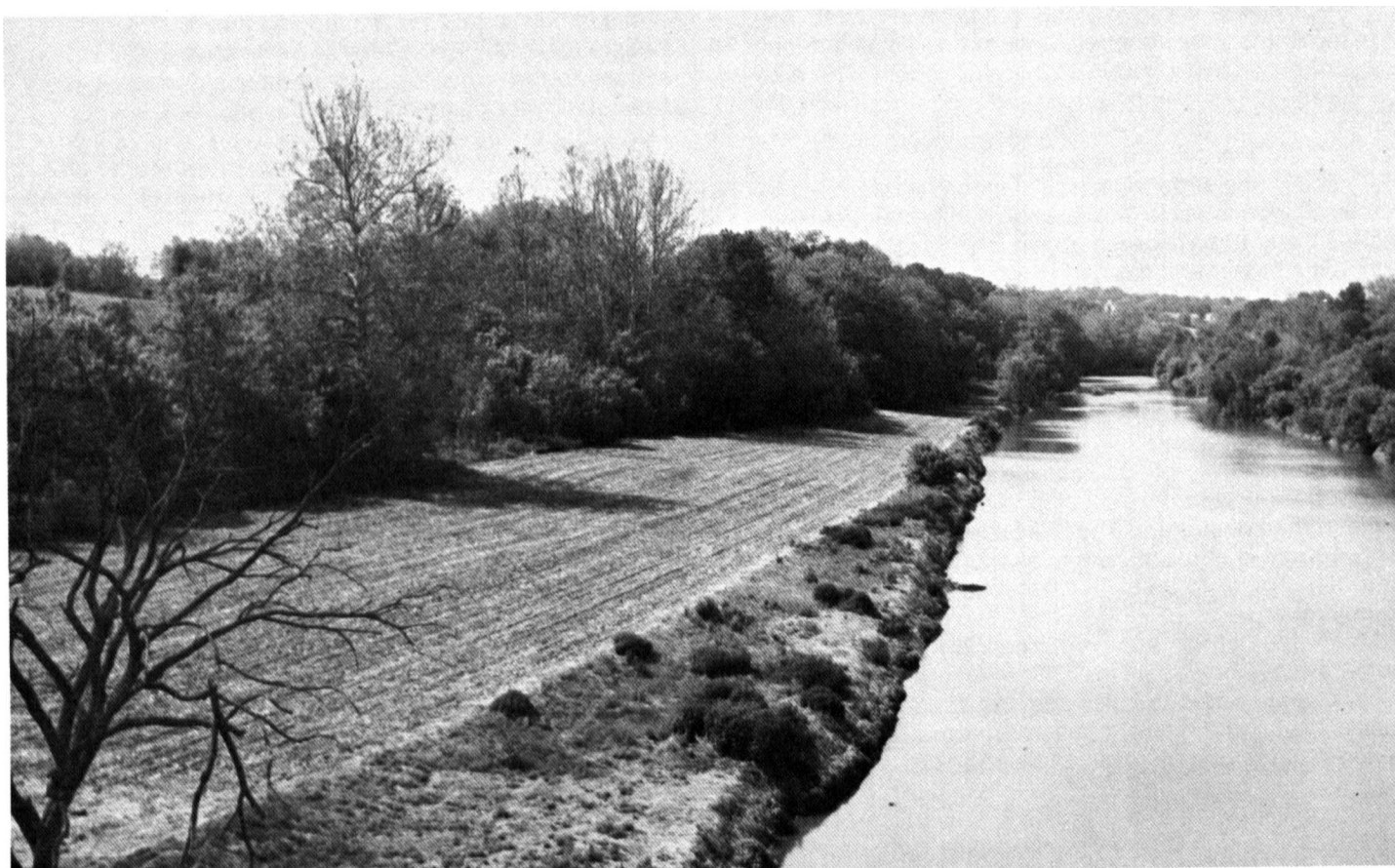


Figure 7.—A cultivated area of Linden silt loam adjacent to the Conestoga Creek.

Slope and the permeability of the soil are the main limitations for community development.

Capability subclass: IIIe; woodland ordination symbol: 2o.

**Lg—Linden silt loam.** This soil is nearly level, deep, and well drained. It is on flood plains of larger streams. The areas of the soil are long and narrow and range from 4 to 135 acres. They are occasionally flooded. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is 40 inches thick. It is dark reddish brown and reddish brown loam in the upper 20 inches and reddish brown sandy loam in the lower 20 inches. The substratum is dark reddish brown very gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lindsides, Clarksburg, Nolin, and Newark soils. Also included are a few small areas of soils that have sand and gravel at a depth of less than 40 inches. The included soils make up about 15 percent of the unit.

The permeability of this Linden soil is moderately rapid in the subsoil and rapid in the substratum. The available water capacity is high. Runoff is slow. Reaction ranges from medium acid to neutral throughout.

Most areas of this soil are farmed (fig. 7). A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but flooding delays tillage and planting in some years. Conservation tillage and the use of cover crops and crop residue will help to maintain tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Flooding is the main limitation of this soil for community development, especially for septic tank absorption fields and as a site for buildings and roads.

Capability class: I; woodland ordination symbol: 1o.



**Ln—Lindside silt loam.** This soil is nearly level, deep, and moderately well drained. It is on flood plains. Slopes are smooth and are 200 to 300 feet in length. The areas of the soil are long and narrow and range from 4 to 300 acres. They are subject to occasional flooding. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is silty clay loam 40 inches thick. It is yellowish brown in the upper 12 inches; light olive brown and mottled in the next 18 inches; and brown, mottled, and firm in the lower 10 inches. The substratum is dark brown, mottled very gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Nolin, Newark, and Elk soils. Inclusions make up about 20 percent of the unit.

The permeability of this Lindside soil is moderate to moderately slow in the subsoil and moderately slow to rapid in the substratum. The available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 18 to 36 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few areas are in nonfarm uses or woodland.

This soil is suited to cultivated crops, but flooding delays tillage and planting in some years. Conservation tillage and the use of cover crops and crop residue will help to maintain tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

Flooding and the seasonal high water table are the main limitations of the soil for community development, especially for septic tank absorption fields and homesites.

Capability subclass: llw; woodland ordination: 1o.

**MaB—Manor silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad, undulating side slopes and ridgetops. Slopes are slightly convex and are 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish red channery silt loam 13 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils; soils that have stones on the surface; soils that have a surface layer of slaty, flaggy, or channery silt loam; and rock outcrop. Also included are areas of soils similar to this Manor soil but that are shallow to bedrock or that are redder and have a subsoil of sandy clay loam or silty clay. Included areas make up about 15 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

This soil has few limitations for most types of community development, but the permeability limits the soil as a site for septic tank absorption fields.

Capability subclass: lle; woodland ordination symbol: 2o.

**MaC—Manor silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on side slopes and ridgetops. Slopes are convex and are 300 to 600 feet in length. The areas of the soil are long and narrow or irregular in shape and range from 3 to 250 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish red channery silt loam 13 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils; soils that have stones on the surface; soils that have a surface layer of slaty, flaggy, or channery silt loam; and rock outcrop. Also included are areas of soils similar to this Manor soil but that are shallow to bedrock or that are redder and have a subsoil of sandy clay loam or silty clay. Included areas make up about 15 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Machine planting is practical on large areas.

Slope and the permeability of the soil are the main limitations for community development.

Capability subclass: IIIe; woodland ordination symbol: 2r.

#### **MaD—Manor silt loam, 15 to 25 percent slopes.**

This soil is moderately steep, deep, and well drained. It is on side slopes of hills and ridges. Slopes are convex and are 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish red channery silt loam 13 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils; soils that have stones on the surface; soils that have a surface layer of slaty, flaggy, or channery silt loam; and rock outcrop. Also included are areas of soils similar to this Manor soil but that are shallow to bedrock or that are redder and have a subsoil of sandy clay loam or silty clay. Included areas make up about 15 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is rapid. Reaction is very strongly acid to neutral throughout.

Most areas of this soil are used for pasture.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Slope limits the use of planting and harvesting

equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope is the major limitation of this soil for community development, especially for septic tank absorption fields and building sites.

Capability subclass: IVe; woodland ordination symbol: 2r.

#### **MbB—Manor very stony silt loam, 3 to 8 percent slopes.**

This soil is gently sloping, deep, and well drained. It is on broad slopes of hills. Slopes are slightly convex and are 300 to 600 feet in length. Stones and boulders 1 to 3 feet in diameter cover about 3 to 15 percent of the surface. The areas of the soil are irregular in shape or long and narrow and range from 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is brown channery silt loam 8 inches thick. The subsoil is yellowish red channery silt loam 14 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Glenville soils and small areas of rock outcrop. Also included are areas of a soil similar to this Manor soil but that is less than 20 inches deep to bedrock. Included soils make up about 20 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium. Reaction is extremely acid to medium acid throughout.

Most areas of this soil are in woodland. A few areas are in pasture.

The stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is high. Machine planting is practical in large areas.

The permeability limits the soil as a site for septic tank absorption fields and is the main limitation for community development.

Capability subclass: VIe; woodland ordination symbol: 2o.

#### **MbD—Manor very stony silt loam, 8 to 25 percent slopes.**

This soil is sloping and moderately steep, deep, and well drained. It is on side slopes of hills and ridges on uplands. Slopes are convex and are 300 to 800 feet in length. Stones and boulders 1 to 3 feet in diameter cover about 3 to 15 percent of the surface. The areas of the soil are irregular in shape or long and narrow and range from 3 to 500 acres.

Typically, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is brown channery silt loam 8 inches thick. The subsoil is yellowish red channery silt loam 14 inches thick. The



substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Pequea soils and small areas of rock outcrop. Also included are areas of a soil similar to this Manor soil but that is less than 20 inches deep to bedrock. Included soils make up about 20 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is medium and rapid. Reaction is extremely acid to medium acid throughout.

Most areas of this soil are in woodland. Some areas are in pasture.

The stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is high. Slope limits the selection and use of equipment.

Slope and the stones on the surface are the main limitations of the soil for community development, especially for homesites and septic tank absorption fields.

Capability subclass: VIs; woodland ordination symbol: 2r.

**MbF—Manor very stony silt loam, 25 to 60 percent slopes.** This soil is steep to very steep, deep, and well drained. It is on side slopes of ridges. Slopes are convex and are 200 to 600 feet in length. Stones and boulders 1 to 3 feet in diameter cover about 3 to 15 percent of the surface. The areas of the soil are long and narrow and range from 3 to 1,500 acres.

Typically, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is brown channery silt loam 8 inches thick. The subsoil is yellowish red channery silt loam 14 inches thick. The substratum is variegated reddish yellow and light brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Chester, Glenelg, and Pequea soils and small areas of rock outcrop. Also included are areas of a soil similar to this Manor soil but that is less than 20 inches deep to bedrock. Included soils make up about 20 percent of the unit.

The permeability of this Manor soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is very rapid. Reaction is extremely acid to medium acid.

Most areas of this soil are in woodland.

Slope and the stones and boulders on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and most areas are wooded. Potential productivity is high. Slope limits the selection and use of equipment.

Slope and the stones and boulders on the surface are the main limitations of the soil for community

development, especially for homesites and septic tank absorption fields.

Capability subclass: VIs; woodland ordination symbol: 2r.

**MdB—Mount Lucas silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and moderately well drained and somewhat poorly drained. It is on concave slopes on uplands. Slopes are 100 to 1,000 feet in length. The areas of the soil are irregular in shape and range from 3 to 80 acres.

Typically, the surface and subsurface layers are brown silt loam and have a combined thickness of about 8 inches. The subsoil is 22 inches thick. It is yellowish brown silty clay loam in the upper 8 inches; mottled, strong brown silty clay loam in the next 10 inches; and mottled, strong brown gravelly clay loam in the lower 4 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown gravelly loam in the upper part and yellowish brown gravelly silt loam in the lower part.

Included with this soil in mapping are small areas of Brecknock, Lansdale, Ungers, and Bucks soils. Also included are small areas of soils similar to this Mount Lucas soil but that are poorly drained or have slopes of more than 8 percent. Included soils make up about 15 percent of the unit.

The permeability of this Mount Lucas soil is moderately slow to slow in the subsoil and moderate to rapid in the substratum. The available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 6 to 24 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are farmed. A few areas are in woodland or nonfarm uses.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, strip cropping, using cover crops, and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. The seasonal high water table will interfere with harvesting and maintenance, but machine planting is practical in large areas.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 2w.

**MeB—Mount Lucas very stony silt loam, 3 to 12 percent slopes.** This soil is gently sloping, deep, and moderately well drained and somewhat poorly drained. It is on concave slopes on uplands. Slopes are 100 to 800 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres. Stones and boulders up to 3 feet in diameter cover about 3 to 15 percent of the surface.

Typically, the surface and subsurface layers are brown silt loam and have a combined thickness of about 8 inches. The subsoil is 22 inches thick. It is yellowish brown silty clay loam in the upper 8 inches; mottled, strong brown silty clay loam in the next 10 inches; and mottled, strong brown gravelly clay loam in the lower 4 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown gravelly loam in the upper part and yellowish brown gravelly silt loam in the lower part.

Included with this soil in mapping are small areas of Brecknock, Ungers, and Bucks soils. Also included are small areas of a soil similar to this Mount Lucas soil but that is poorly drained. Included soils make up about 15 percent of the unit.

The permeability of this Mount Lucas soil is moderately slow to slow in the subsoil and moderate to rapid in the substratum. The available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 6 to 24 inches. Reaction is strongly acid to neutral throughout.

Most areas of this soil are wooded. A few areas are in pasture or nonfarm uses.

The stones on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is high. The seasonal high water table and the stones on the surface limit the use of equipment for planting and harvesting.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: VIe; woodland ordination symbol: 2w.

**Nc—Newark silt loam.** This soil is nearly level, deep, and somewhat poorly drained. It is on flood plains. The areas are long and narrow and range from 3 to 250 acres. They are subject to occasional flooding. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 16 inches thick. The subsoil is mottled, light olive brown and grayish brown silty clay loam 16 inches thick. The substratum is gray, mottled gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lindside, Holly, and Nolin soils. Also included are areas of a soil similar to this Newark soil but that has a dark layer in the subsoil. Included soils make up about 35 percent of the unit.

The permeability of this Newark soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is very slow. The seasonal high water table is at a depth of 6 to 18 inches. Reaction is medium acid to mildly alkaline throughout.

Most areas of this soil are in pasture. A few areas are wooded.

This soil is suited to cultivated crops, but the seasonal high water table will interfere with tillage and planting. Where suitable outlets are available, subsurface drainage helps to remove excess water and increases the suitability for some crops. Conservation tillage will help to control erosion. Incorporating manure and crop residue into the surface layer helps to maintain or improve tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. Flooding and the seasonal high water table will delay harvesting, but machine planting is practical in large areas. Trees on this soil are subject to uprooting during windy periods.

Flooding and the seasonal high water table are major limitations of the soil as a site for homes, roads, and septic tank absorption fields.

Capability subclass: IIw; woodland ordination symbol: 1w.

**Nd—Newark silt loam.** This soil is nearly level, deep, and somewhat poorly drained. It is on flood plains. The areas are long and narrow and range from 3 to 250 acres. They are subject to occasional flooding. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 16 inches thick. The subsoil is mottled, light olive brown and grayish brown silty clay loam 16 inches thick. The substratum is gray, mottled gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lindside, Holly, and Nolin soils. Also included are areas of a soil similar to the Newark soil but that has a dark layer in the subsoil. Included soils make up about 35 percent of the unit.

The permeability of this Newark soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is very slow. The seasonal high water



table is at a depth of 6 to 18 inches. Reaction is medium acid to mildly alkaline throughout.

Most areas of this soil are in pasture. A few areas are wooded.

This soil is suited to cultivated crops, but the seasonal high water table will interfere with tillage and planting. Where suitable outlets are available, subsurface drainage helps to remove excess water and increases the suitability for some crops. Conservation tillage will help to control erosion. Incorporating manure and crop residue into the surface layer helps to maintain or improve tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The proper use of stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. Flooding and the seasonal high water table will delay harvesting, but machine planting is practical in large areas. Trees on this soil are subject to uprooting during windy periods.

Flooding and the seasonal high water table are major limitations of the soil as a site for homes, roads, and septic tank absorption fields.

Capability subclass: 1lw; woodland ordination symbol: 1w.

**Ne—Nolin silt loam.** This soil is nearly level, deep, and well drained. It is on flood plains. Slopes are smooth and are 100 to 300 feet in length. The areas of the soil are irregular in shape and range from 3 to 200 acres. They are occasionally flooded. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is brown, yellowish brown, and dark brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Newark and Linside soils. Also included are small areas of a soil that has more sand and is yellower in the subsoil than this Nolin soil. The inclusions make up about 15 percent of the unit.

The permeability of this Nolin soil is moderate in the subsoil and substratum, and the available water capacity is high. Runoff is slow. Reaction is medium acid to moderately alkaline throughout.

Most areas of this soil are in pasture. A few areas are wooded.

This soil is suited to cultivated crops, but flooding delays tillage and planting in some years. Conservation tillage and the use of cover crops and crop residue will help to maintain tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern.

The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is very high. Flooding occasionally delays harvesting operations for short periods. Machine planting is practical in large areas.

Flooding is the main limitation of the soil for community development, especially for sites for roads, homes, and septic tank absorption fields.

Capability class: I; woodland ordination symbol: 1o.

**Pa—Penlaw silt loam.** This soil is nearly level, deep, and somewhat poorly drained. It is on ridgetops and side slopes of low ridges. Slopes range from 100 to 500 feet in length. The areas of the soil are irregular in shape and range from 5 to 100 acres. Slopes range from 0 to 5 percent.

Typically, the surface layer is brown silt loam about 12 inches thick. The subsoil is mottled and is 43 inches thick. It is yellowish brown silty clay loam in the upper 6 inches; strong brown, firm silty clay loam in the next 11 inches; and strong brown, very firm and brittle silt loam in the lower 26 inches. The substratum is mottled, dark grayish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Letort, Duffield, Hagerstown, Conestoga, and Clarksburg soils. Also included are a few areas of poorly drained soils and gently sloping soils. Included soils make up about 15 percent of the unit.

The permeability of this Penlaw soil is moderate in the upper part of the subsoil and slow and very slow in the lower part of the subsoil and in the substratum. Runoff is slow. Reaction ranges from medium acid to neutral throughout. The seasonal high water table is at a depth of 6 to 18 inches.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but the seasonal high water table delays cultivation and planting. Where suitable outlets are available, subsurface drainage will help to remove excess water and improve the suitability for crops. Conservation tillage, strip cropping, using cover crops, and crop residue management are practices that help to control erosion.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: IIIw; woodland ordination symbol: 2w.

**PeC—Pequea silt loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on side slopes and ridgetops on uplands. Slopes are convex and range mainly from 300 to 900 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is very dark grayish brown channery loam 16 inches thick. The substratum is dark olive gray and olive gray channery loam 26 inches thick. Dark gray and black bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Conestoga, Letort, Hollinger, and Clarksburg soils. Also included are small areas of rock outcrop, soils with slopes of less than 8 percent, and soils that are deeper than 60 inches to bedrock. Included soils make up 30 percent of the unit.

The permeability of this Pequea soil is moderate to moderately rapid in the subsoil and substratum. Available water capacity is high. Runoff is medium. Reaction is slightly acid or neutral in the surface layer and subsoil and mildly alkaline or moderately alkaline in the substratum.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is practical on large areas.

Slope and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 3r.

**PeD—Pequea silt loam, 15 to 25 percent slopes.** This soil is moderately steep, deep, and well drained. It

is on hillsides on uplands. Slopes are convex and are 100 to 700 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is very dark grayish brown channery loam 16 inches thick. The substratum is dark olive gray and olive gray channery loam 26 inches thick. Dark gray and black bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Manor, Conestoga, Hollinger, and Letort soils. Also included are small areas of rock outcrop. Included soils make up about 15 percent of the unit.

The permeability of this Pequea soil is moderate to moderately rapid in the subsoil and substratum. Available water capacity is high. Runoff is rapid. Reaction is slightly acid or neutral in the surface layer and subsoil and mildly alkaline or moderately alkaline in the substratum.

Most areas of this soil are used for pasture. A few areas are wooded.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope and the depth to bedrock in areas where bedrock is at a depth of less than 60 inches are the main limitations for community development, especially for homesites and septic tank absorption fields.

Capability subclass: IVe; woodland ordination symbol: 3r.

**PeE—Pequea silt loam, 25 to 50 percent slopes.** This soil is steep to very steep, deep, and well drained. It is on side slopes of hills and ridges. Slopes are convex and range mainly from 300 to 500 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is very dark grayish brown, channery loam 16 inches thick. The substratum is dark olive gray and olive gray channery loam 26 inches thick. Dark gray and black bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Manor and Hollinger soils. Also included are small areas



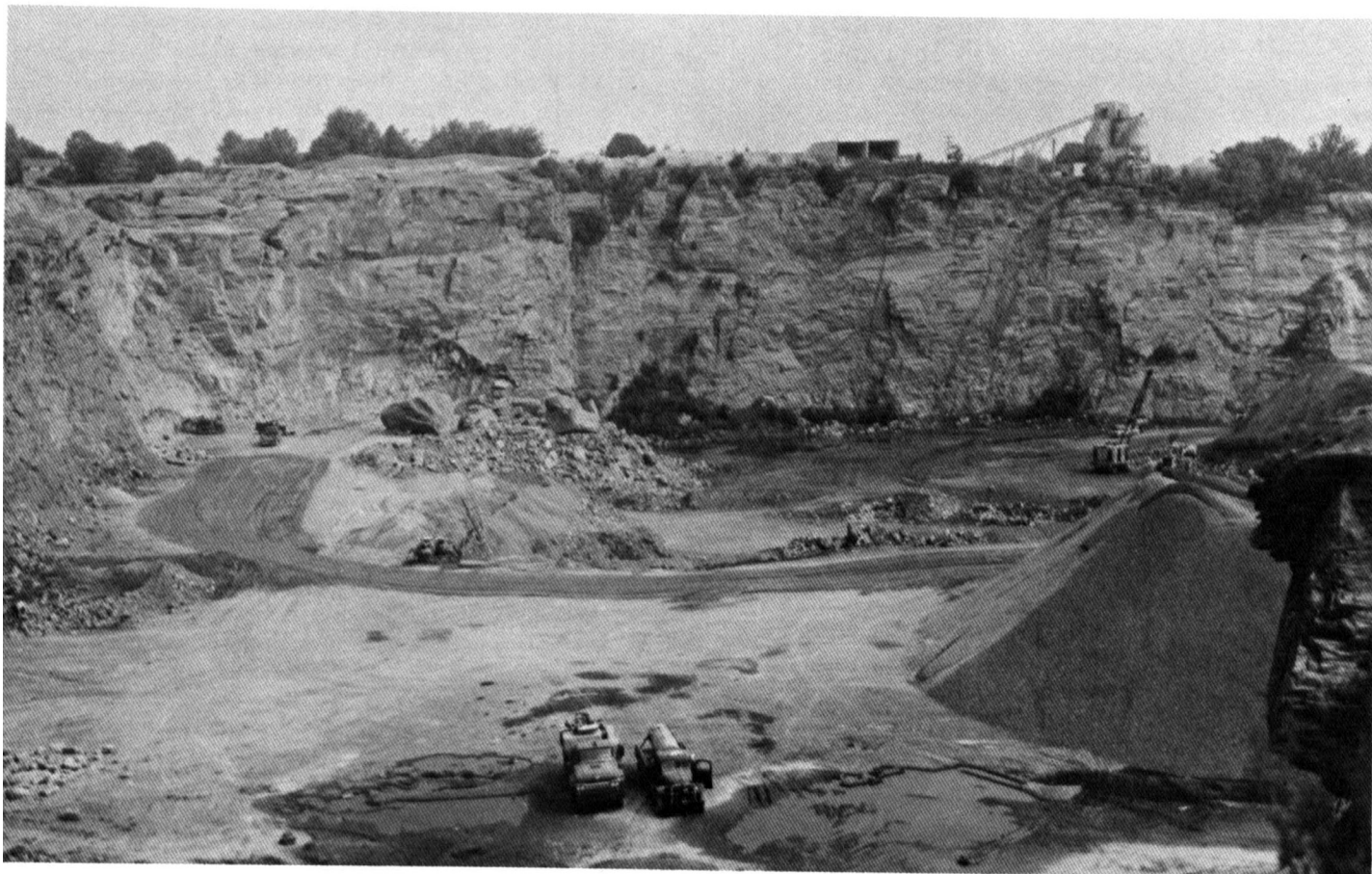


Figure 8.—An area of Pits, quarry.

of soils similar to this Pequea soil but that are less than 40 inches deep to bedrock and some small areas of rock outcrop. Included soils make up about 15 percent of the unit.

The permeability of this Pequea soil is moderate to moderately rapid in the subsoil and substratum. Available water capacity is high. Runoff is very rapid. Reaction is slightly acid or neutral in the surface layer and subsoil and mildly alkaline or moderately alkaline in the substratum.

Slope makes this soil generally unsuited to farming. The soil is suited to trees, and most areas are wooded. Potential productivity is high. Slope limits the use of machinery for the planting, maintenance, and harvesting of trees. The erosion hazard is very severe near access roads.

Slope and the depth to bedrock are major limitations of the soil for most types of community development, especially for sites for homes, roads, and septic tank absorption fields.

Capability subclass: Vle; woodland ordination symbol: 3r.

**Qu—Pits, quarry.** This unit consists of areas that have been mined or that are being mined for limestone, shale, sand, or gravel (fig. 8). The limestone quarries are in valleys. The shale pits are on ridges, and the sand and gravel pits are generally along streams and rivers.

Most areas of this unit have little or no vegetation. The limestone quarries commonly have high walls, some exceeding 100 feet in height. The lack of soil material and the difficulty of excavation make reclamation of these areas difficult. Onsite investigation is needed to determine the suitability of the unit for any use.

This unit is not assigned to a capability subclass or woodland ordination group.

**RaB—Readington silt loam, 3 to 10 percent slopes.** This soil is gently sloping, deep, and moderately well drained. It is on lower slopes and in upper drainageways on uplands. Slopes are concave and are 300 to 1,000



feet in length. The areas of the soil are irregular in shape and range from 3 to 65 acres.

Typically, the surface layer is dark reddish brown silt loam about 9 inches thick. The subsoil is 49 inches thick. In sequence downward, it is reddish brown clay loam 16 inches thick; mottled, dark red, firm clay loam 8 inches thick; mottled, dusky red, very firm and brittle clay loam 15 inches thick; and dark red, very firm and brittle channery clay loam 10 inches thick. Dark red sandstone bedrock is at a depth of 58 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Lansdale, and Abbottstown soils. Also included are soils similar to this Readington soil but that are more than 60 inches deep to bedrock. Included soils make up about 25 percent of the unit.

The permeability of this Readington soil is moderate in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum. Available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 18 to 36 inches. Reaction ranges from very strongly acid to slightly acid in the surface layer and subsoil.

Most areas of this soil are farmed. A few small areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees. Potential productivity is moderately high. The seasonal high water table will delay harvesting, but machine planting is practical on larger areas. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: IIe; woodland ordination symbol: 3o.

**RbB—Readington extremely stony silt loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and moderately well drained. It is on lower slopes and drainageways on uplands. Slopes are concave and mainly range from 300 to 800 feet in length. The areas of the soil are irregular in shape and range from 10 to 60 acres. Stones and boulders up to 3 feet in diameter cover 15 to 50 percent of the surface area.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is dark reddish brown silt loam 6 inches thick. The subsoil is 49 inches thick. In sequence downward, it is 16 inches of reddish brown clay loam; 8 inches of mottled, dark red, firm clay loam; 15 inches of mottled, dusky red, very firm and brittle clay loam; and 10 inches of dark red, very firm and brittle channery clay loam. Dark red sandstone bedrock is at a depth of 58 inches.

Included with this soil in mapping are small areas of Bucks, Ungers, Lansdale, and Abbottstown soils. Also included are Readington soils with slopes of more than 8 percent and soils similar to this Readington soil but that are more than 60 inches deep to bedrock. Included soils make up about 25 percent of the unit.

The permeability of this Readington soil is moderate in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum. Available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 18 to 36 inches. Reaction ranges from very strongly acid to slightly acid in the surface layer and subsoil.

Most areas of this soil are wooded. A few small areas are in nonfarm uses.

The stones on the surface make this soil generally unsuitable for farming. The soil is suited to trees. Potential productivity is moderately high. The seasonal high water table and the stones on the surface limit harvesting and mechanical planting. Seedling mortality is high, and uprooting is a hazard during windy periods.

The permeability and the seasonal high water table are the main limitations of the soil for community development. Both limit the soil as a site for homes and septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 3x.

**Rd—Rowland silt loam.** This soil is nearly level, deep, and moderately well drained to somewhat poorly drained. It is on flood plains. The areas of the soil are long and narrow and range from 5 to 175 acres. They are occasionally flooded. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark reddish brown silt loam about 9 inches thick. The subsoil is 16 inches thick. It is reddish brown silt loam that is mottled in the lower part. The substratum extends to a depth of 60 inches or more. The upper part is mottled, pinkish gray silt loam, and the lower part is stratified sand and gravel.

Included with this soil in mapping are small areas of Bowmansville, Readington, and Abbottstown soils. Also included are small areas of soils that have more clay in the subsoil than this Rowland soil, soils that have a yellow subsoil, soils that have stratified sand and gravel within 40 inches of the surface, and soils that have slopes of more than 3 percent. Inclusions make up about 15 percent of the unit.



The permeability of this Rowland soil is moderate to moderately slow in the subsoil and moderately rapid in the substratum. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 12 to 36 inches. Reaction ranges from strongly acid to neutral throughout.

Most areas of this soil are used for pasture. Some areas are wooded or in cultivated crops.

This soil is suited to most cultivated crops, but the seasonal high water table and flooding delay tillage and planting. Conservation tillage and incorporating manure and crop residue into the surface layer help to maintain or improve tilth.

This soil is suited to pasture. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Grazing when the soil is wet will compact the surface layer. The use of proper stocking rates, deferred grazing, and rotational grazing are practices that help to maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is high. Flooding and the seasonal high water table interfere with harvesting. Machine planting is practical on larger areas.

Flooding and the seasonal high water table limit the soil as a site for homes and, along with the permeability, are main limitations for septic tank absorption fields.

Capability subclass: 1lw; woodland ordination symbol: 2w.

**UaB—Ungers loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on broad side slopes and ridgetops. Slopes are convex and are 200 to 400 feet in length. The areas of the soil are oval and range from 3 to 150 acres.

Typically, the surface layer is dark reddish brown loam 10 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches, dark reddish brown loam in the next 16 inches, and dusky red gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks, Lansdale, and Readington soils and Ungers soils with slopes of less than 3 percent. Also included are a few areas of soils that are less than 40 inches deep to bedrock, soils on terraces with a subsoil of sandy loam, and soils that have more clay in the subsoil than this Ungers soil. Included soils make up about 25 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is medium. Reaction is extremely acid to neutral throughout.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Machine planting is suitable in large areas.

In some areas bedrock is at a depth of 40 to 80 inches and is a limitation of the soil as a site for septic tank absorption fields.

Capability subclass: 1le; woodland ordination symbol: 3o.

**UaC—Ungers loam, 8 to 15 percent slopes.** This soil is sloping, deep, and well drained. It is on broad side slopes and ridgetops. Slopes are convex and are 300 to 700 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark reddish brown loam 10 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches, dark reddish brown loam in the next 16 inches, and dusky red gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks, Lansdale, and Readington soils. Also included are Ungers soils with a surface layer of gravelly loam, soils that are less than 40 inches deep to bedrock, and soils with more clay in the subsoil than this Ungers soil. Included soils make up about 15 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is medium. Reaction is extremely acid to neutral throughout.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops. Terracing, stripcropping, and using cover crops, conservation tillage, and grassed waterways are practices that help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing

are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Placing skid trails and logging roads on the contour helps to reduce erosion. Machine planting is practical in large areas.

Slope and the depth to bedrock in areas where bedrock is at a depth of 40 to 80 inches are the main limitations of the soil for community development. Both limit the soil as a site for septic tank absorption fields.

Capability subclass: IIIe; woodland ordination symbol: 3o.

**UaD—Ungers loam, 15 to 25 percent slopes.** This soil is moderately steep, deep, and well drained. It is on side slopes of the uplands. Slopes are convex and are 200 to 400 feet in length. The areas of the soil are irregular in shape and range from 2 to 50 acres.

Typically, the surface layer is dark reddish brown loam 10 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches, dark reddish brown loam in the next 16 inches, and dusky red gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks, Lansdale, and Readington soils. Also included are areas of Ungers soils in which the surface layer is more than 20 percent rock fragments, soils that are less than 40 inches deep to bedrock, soils with a surface layer and subsoil of sandy loam, and soils that have a subsoil of silty clay. Included soils make up about 20 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is medium. Reaction is extremely acid to neutral throughout.

Most areas of this soil are farmed. A few areas are wooded or in nonfarm uses.

This soil is suited to cultivated crops, but the erosion hazard is very severe. Stripcropping and conservation tillage help to reduce runoff and control erosion. Using crop residue and including hay and cover crops in the cropping system are ways of maintaining the organic matter content and tilth.

This soil is suited to pasture. The prevention of overgrazing is the major pasture management concern. The use of proper stocking rates and rotational grazing are practices that maintain tilth and desired plant species.

This soil is suited to trees, and potential productivity is moderately high. Slope limits the use of planting and harvesting equipment. Erosion can be reduced by constructing logging roads on the contour.

Slope and the depth to bedrock are the major limitations of this soil for community development,

especially as a site for homes or septic tank absorption fields.

Capability subclass: IVe; woodland ordination symbol: 3r.

**UbB—Ungers extremely stony loam, 3 to 8 percent slopes.** This soil is gently sloping, deep, and well drained. It is on convex upland slopes. Slopes are 500 to 1,500 feet in length. The areas of the soil are irregular in shape and range from 3 to 150 acres. Stones and boulders about 1 to 3 feet in diameter cover 15 to 50 percent of the surface area.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is dark brown loam 7 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches, dark reddish brown loam in the next 16 inches, and dark reddish brown gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks, Lansdale, and Readington soils and a few areas of soils that are less than 40 inches deep to bedrock, soils with a surface layer and subsoil of sandy loam, and soils similar to this Ungers soil but with a subsoil of silty clay loam. Included soils make up 35 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is medium. Reaction is extremely acid to neutral throughout.

Most areas of this soil are wooded. A few small areas are in nonfarm uses.

The stones on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is moderate, but the stones on the surface limit the use of equipment for management and harvesting.

The stones on the surface and the depth to bedrock in areas where bedrock is at a depth of 40 to 80 inches are the main limitations of the soil for community development. They especially limit the soil as a site for homes or septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 3x.

**UbD—Ungers extremely stony loam, 8 to 25 percent slopes.** This soil is sloping and moderately steep, deep, and well drained. It is on convex upland side slopes. Slopes are 500 to 2,500 feet in length. The areas of the soil are irregular in shape and range from 3 to 1,500 acres. Stones and boulders about 1 to 3 feet in diameter cover 15 to 50 percent of the surface area.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is dark brown loam 7 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches,



dark reddish brown loam in the next 16 inches, and dark reddish brown gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks, Lansdale, and Readington soils and a few areas of soils that are less than 40 inches deep to bedrock, soils with a surface layer and subsoil of sandy loam, and soils similar to this Ungers soil but with a subsoil of silty clay loam. Included soils make up 40 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is rapid. Reaction is extremely acid to neutral throughout.

Most areas of these soils are wooded. A few small areas are in nonfarm uses.

The stones on the surface make this soil generally unsuitable for farming. The soil is suited to trees, and potential productivity is moderate, but the stones and the slope limit the use of equipment for management and harvesting. Placing access roads and skid trails on the contour helps to control erosion in wooded areas.

Slope and the stones on the surface are the main limitations of the soil for community development, especially for sites for homes, roads, and septic tank absorption fields.

Capability subclass: VIIs; woodland ordination symbol: 3x.

**UbE—Ungers extremely stony loam, 25 to 50 percent slopes.** This soil is steep and very steep, deep, and well drained. It is on convex upland slopes. Slopes are 100 to 2,500 feet in length. The areas of the soil are irregular in shape and range from 5 to 1,000 acres. Stones and boulders about 1 to 3 feet in diameter cover 15 to 50 percent of the surface area.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is dark brown loam 7 inches thick. The subsoil is 36 inches thick. It is dark reddish brown sandy clay loam in the upper 10 inches, dark reddish brown loam in the next 16 inches, and dark reddish brown gravelly loam in the lower 10 inches. The substratum is dusky red gravelly sandy loam 4 inches thick. Dusky red sandstone bedrock is at a depth of 50 inches.

Included with this soil in mapping are small areas of Bucks and Lansdale soils and a few areas of soils that are less than 40 inches deep to bedrock, soils with a surface layer and subsoil of sandy loam, and soils similar to this Ungers soil but with a subsoil of silty clay loam. Included soils make up 35 percent of the unit.

The permeability of this Ungers soil is moderate in the subsoil and substratum. Available water capacity is high. Runoff is very rapid. Reaction is extremely acid to neutral throughout.

Slope and the stones on the surface make this soil generally unsuitable for farming and are the major limitations for most types of community development. Most areas are wooded. The soil is suited to trees, and potential productivity is moderate, but the slope and the stones limit the use of equipment for management and harvesting. Placing access roads and skid trails on the contour helps to control erosion in wooded areas.

Capability subclass: VIIs; woodland ordination symbol: 3x.

**Uc—Urban land.** This unit consists of areas where 85 percent or more of the surface is covered by roads, railroads, sidewalks, parking areas, houses, factories, and other structures. These areas dominantly are nearly level to sloping, but a few are moderately steep. The areas range from about 10 to 2,000 acres.

Included with this unit in mapping are areas of fill material and small areas of soils where structures cover less than 85 percent of the surface, mainly in parks and small wooded areas.

Onsite investigation is needed to determine the limitations of the unit for any use.

This unit is not assigned to a capability subclass or woodland ordination group.

**Ud—Udorthents, loamy.** This unit consists of shallow to deep, well drained soils mixed with rock fragments. This material was stockpiled or disturbed by digging for landfills, quarries, and borrow pits and during dam construction. These areas are long and narrow and range from 7 to 200 acres. Slopes are complex and irregular and range from 0 to 25 percent.

Generally, the surface layer is brown gravelly loam about 8 inches thick. The substratum is yellowish brown very gravelly loam to a depth of 60 inches or more.

Included with these soils in the mapping are small areas of undisturbed soils that make up about 10 percent of the unit.

The permeability, available water capacity, and rate of runoff in this unit are variable. Reaction is strongly acid to neutral throughout.

Grass, shrubs, and trees cover most areas of this unit. Onsite investigation is needed to determine the suitability of an area for any use.

This unit is not assigned to a capability subclass or woodland ordination group.

# Prime Farmland

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Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and water supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not in urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of water from precipitation or irrigation. It also has favorable temperature and growing season and acceptable levels of acidity or alkalinity. It

has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 8 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

About 344,000 acres, or nearly 55 percent of Lancaster County, meets the soil requirements for prime farmland. The areas are throughout the county, but most are in the valleys and on secondary ridges. Most of the acreage of this prime farmland is used for crops, mainly corn and alfalfa.

A recent trend in land use in most parts of Lancaster County has been toward the loss of prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible and difficult to cultivate and usually are less productive.

Soil map units that make up prime farmland in Lancaster County are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."





# Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Crops and Pasture

John C. Spitzer, agronomist, Soil Conservation Service, assisted with the preparation of this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated

yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Farming is the major land use in Lancaster County. According to the 1978 Census of Agriculture, 371,000 acres was used for crops and pasture. Of this total, 17,496 acres was used for permanent pasture. The 1980 Pennsylvania Crop and Livestock Annual Summary reported 200,700 acres of corn, 40,100 acres of small grain, 81,800 acres of alfalfa and other hay, 12,000 acres of tobacco, 1,556 acres in orchards, and the rest in cropland pasture, idle cropland, or other uses.

Soil erosion in these and other areas results in the concentration of soil in drainage channels, on lower slopes, and in fence rows. It further results in sediment deposition in streams and reservoirs and causes loss of productive topsoil.

Conservation and erosion-control practices provide protective cover for the soils, reduce surface water runoff and sedimentation, and increase infiltration in the soils. Cropping systems that maintain a plant cover help to protect the soils. Deferred grazing and the use of grasses and legumes on areas used for hay and pasture help to reduce erosion, provide nitrogen, and improve tilth. Contour farming, using terraces, conservation tillage, and cover crops, and incorporating crop residue into the soil help to increase infiltration and reduce erosion on cultivated areas. These practices are suited to most soils except those with steep and irregular slopes, which are not suitable for terraces.

Terraces and diversions reduce the length of slopes and result in reducing surface water runoff and erosion. The use of terraces is practical on deep, well drained soils with moderate, uniform slopes. Duffield, Conestoga, and Glenelg soils are examples of soils suitable for terraces and diversions. Contour farming and strip cropping also are suited to soils with moderate, uniform slopes, for example, Bedington, Bucks, and Glenelg soils.

Soil drainage is a major management concern on some of the soils in Lancaster County. A few of the soils, such as poorly drained Baile and Holly soils, are so wet



that crop production is not practical or economically feasible without artificial drainage.

The somewhat poorly drained soils are so wet that crop damage results during most years unless artificial drainage is used. Examples in this category are Abbottstown and Penlaw soils.

Some small, wet areas are in drainageways and swales. These small areas are generally within larger areas of moderately well drained Clarksburg and Readington soils. Artificial drainage could improve the management and productivity of most of these small areas, but this may not be economically feasible.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is usually needed for poorly drained soils that are intensively farmed. Drains must be more closely spaced in the soils with slow permeability than in others that are more permeable. In addition, finding adequate outlets for tile drainage systems is often difficult. Baile soils are an example of soils with slow permeability and poor drainage.

Some soils used for crop production in the survey area have a low content of organic matter. Generally, the structure of such soils is weak, and heavy rainfall commonly results in crusting of the surface when the soil dries. The crust usually is hard and nearly impervious to water, and it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material help to improve soil structure and reduce crust formation.

Generally, fall plowing is not considered to be an effective practice on light-colored soils with a surface layer of silt loam. Fall plowing commonly results in the formation of a crust during the winter and spring. Many soils are nearly as dense and hard at planting time after fall plowing as they were before they were plowed. In addition, sloping soils are subject to accelerated erosion if they are plowed in the fall.

Soils that are deep and well drained and that warm early in the spring are best suited to special crops such as tobacco. Good tilth and high available water capacity are soil properties needed for a good stand. Examples of soils with such properties are Duffield, Conestoga, and Letort soils.

### **Yields per Acre**

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

### **Land Capability Classification**

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

*Capability classes*, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.



Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

## Woodland Management and Productivity

Paxton G. Wolfe, woodland conservationist, Soil Conservation Service, assisted with the preparation of this section.

Woodland covers about 98,500 acres in Lancaster County, most of which is privately owned. Of the total amount of woodland, about 96,100 acres, or about 98 percent, is classified as commercial (7).

Stands of second- and third-growth trees make up the forests in the county. The Forest Service classifies the commercial woodland in the county as 76 percent oak types and 24 percent northern hardwood types.

Oak types contain the oak-pine, oak-hickory, and oak-gum groups. White, scarlet, chestnut, northern red, or black oaks make up most of the stocking. Scotch, Virginia, or pitch pines or eastern redcedar make up 25 to 50 percent of the stocking. The common associates are red maple, black cherry, white ash, and hickory.

Northern hardwood types consist of sugar maple, beech, or yellow birch as the component species. Common associates are red maple, sweet birch, black cherry, white ash, northern red oak, basswood, aspen, white oak, hickory, hemlock, and eastern white pine.

Sawtimber makes up about 71 percent of the acreage of commercial forestland and poletimber 15 percent. The remaining 14 percent is in seedling and sapling stands and in stands that are less than 10 percent stocked with growing stock trees.

In general, the soils in the county are capable of supporting good stands of red oak, sugar maple, yellow-poplar, and eastern white pine. The soils rated low for potential productivity generally will not economically justify management to increase yields of wood crops. Soils that are rated moderate are the most difficult to appraise for management of wood crops. A thorough inventory of the growing stock and their quality on the site is needed. Considering the market potential for the species and whether the soils rated moderate are mixed with larger areas of more productive soils will help to determine if woodland management is feasible.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *x*, *w*, *d*, *c*, *f*, and *r*.

In table 8, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of



equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

*Seedling mortality* ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or common trees on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor to grow for woodcrop production. They are the best tree species in regard to growth rate, quality, value, and marketability. Other tree species that commonly occur on the soil are also listed regardless of potential value and growth.

*Trees to plant* are those that are suited to the soils and to commercial wood production.

## Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil

properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

*Camp areas* require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

## Wildlife Habitat

The principal game species in the county are white-tailed deer, gray squirrel, cottontail rabbit, ruffed grouse,



ringneck pheasant, mourning dove, and various kinds of waterfowl. The major furbearers are fox, muskrat, raccoon, weasel, and opossum. Some of the nongame wildlife are songbirds, frogs, turtles, poisonous and nonpoisonous reptiles, and small mammals.

White-tailed deer, squirrels, and ruffed grouse generally seek the protection of the forests but prefer to feed on farm crops. Some areas in the Ungers-Bucks-Lansdale unit on the general soil map provide habitat for those species. Ringneck pheasants and mourning doves generally occupy areas where corn is grown, commonly in the Duffield-Hagerstown unit. Cottontail rabbits also occupy the farmland areas and are plentiful in the Bedington unit but inhabit the other farmed areas. Raccoon and muskrat generally live along the rivers, streams, lakes, and ponds throughout the county.

Lancaster County has many species of waterfowl along major streams, ponds, and larger dams and along the Susquehanna River. The common species are mallard, Canada geese, black ducks, and wood ducks, which frequently inhabit the major streams and ponds, often resting in migration and sometimes staying to nest in the area. The Middle Creek Waterfowl Management Area, owned and managed by the Pennsylvania Game Commission, is a major habitat for those species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be

expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, orchardgrass, brome grass, red clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, pokeberry, and ragweed.

*Hardwood trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are silky dogwood, autumn-olive, and crabapple.

*Coniferous plants* furnish browse, buds, seeds and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and juniper.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattails, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control



structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include mourning dove, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, heron, and muskrat.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey,

determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

## Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to



bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

*Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

### Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features

are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function



unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

*Sanitary landfills* are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

### Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil

properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

*Sand and gravel* are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain



sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in

construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the



root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

# Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit and plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The



estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

## Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability* refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of

water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Soil reaction* is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

## Physical and Chemical Analyses of Selected Soils

This section was prepared by R.L. Cunningham, G.W. Petersen, E.J. Ciolkosz, R.P. Matelski, R. Pennock, Jr., and R.C. Counce, Department of Agronomy, Soil Characterization Laboratory, Pennsylvania State University.

This section summarizes the laboratory soil characterization data of six soil series that are extensive in Lancaster County. The county has one of the longest histories of soil characterization and laboratory analysis of any county in Pennsylvania. The various field survey parties and cooperating agencies have been sampling and analyzing the soils of the county since about 1955. The laboratory analyses in 1955 were performed at the Soil Conservation Service soils laboratory in Beltsville, Maryland. The post-1955 analytical work has been performed at the Pennsylvania State University Soil Characterization Laboratory.

In all, 236 samples of 28 pedons from Lancaster County have been described, sampled, and analyzed. Some of these pedons are representative of only a very small acreage of the soils recognized in the county. Because of developments and changes in the concepts of soil series, other pedons sampled do not meet the current concepts of the types of soils they were originally sampled to represent. For these reasons and for brevity, only six selected pedons will be described. They are Glenelg (3627), Manor (3628), Pequea (3631), Letort (3620), Duffield (3618), and Hagerstown (3619). The number in parentheses following the soil name is the Pennsylvania State University laboratory identification number of the pedon sampled. The pedons given represent or are similar to several of the major soils in Lancaster County. Complete data from the pedons sampled in the county are available in the published laboratory characterization data (4) or from the Soil Characterization Laboratory at Penn State University.

The Penn State University Laboratory soil characterization identifies properties useful in studying soil formation processes, in interpreting land use limitations, in classifying soils, and in understanding genetic concepts of soils. The soil and site characteristics have a dominant influence on how a particular area will respond to various land uses and management. Once the relationship between a certain set of soil characteristics and the response is determined, it can be assumed that the same set of soil

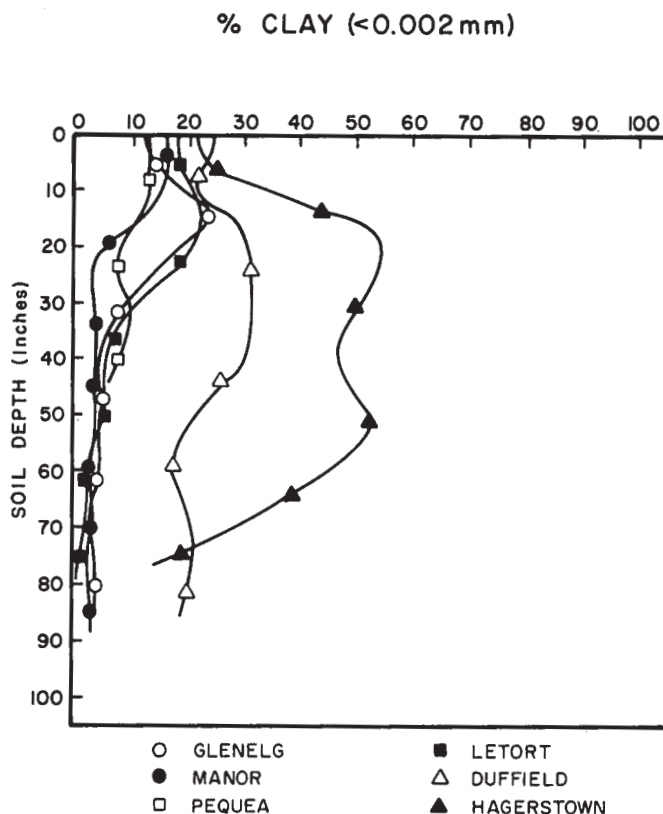


Figure 9.

characteristics found elsewhere will produce the same response. Standard soil characterization methodology (5) was used in the soil analyses shown in this section.

## Clay Content

The amount of clay in a soil affects such physical characteristics of the soil as plasticity, shrink-swell, bulk density, and water-holding capacity. It also affects chemical characteristics such as the ability of the soil to retain nutrients and the response of the soil to many farm management practices such as liming and fertilizing. The clay content is further important to the study of the genesis and classification of the soils.

Figure 9 shows the relationship between the clay content and the depth of the Glenelg, Manor, Pequea, Letort, Duffield, and Hagerstown soils. The Glenelg and Manor soils formed on acid crystalline rocks, the Pequea and Letort soils on metamorphic rocks, and the Duffield and Hagerstown soils on limestone bedrock.

The data show that the clay content of the upper 6 inches ranges from 13 to 25 percent regardless of the series or parent material. Review of all the pedons from Lancaster County shows this to be true in all but a few.



The small range in clay content in the surface horizons is not reflected in the underlying horizons of the soils. The Pequea and Manor soils, for example, show a decrease in clay content below the surface layer, while the Glenelg and Letort profiles show a slight "clay bulge," or increase in clay, at 10 to 30 inches below the surface. This is evidence of slightly more soil development in the Glenelg and Letort profiles. Below a depth of 30 inches, all four of these pedons (developed from acid crystalline rock or metamorphic rock) have a clay content of less than 10 percent. In contrast to this, the Duffield and Hagerstown soils show a marked increase in clay content at a depth of more than 10 inches. The Duffield soil, by definition, is lower in clay content in the subsoil than the Hagerstown soil. The soils that formed in limestone are characteristically high in clay content in the subsoil when compared to soils formed on other rock types, a factor that affects the use and management decisions for these soils. The soils that formed in limestone are the most pedologically developed soils in the survey area.

### Available Water in the Soil

The amount of water available to plant roots is dependent on the amount and type of clay, the organic matter content, the soil depth, and the coarse-fragment content.

Figure 10 shows the available water of the total soil in relation to the depth of the six pedons. The data are the difference between 1/3 bar and 15-bar measurements adjusted for coarse fragments. The data show that nearly all of the soils have similar amounts of available water in the upper 6 inches of the profile. The exception to this is the Hagerstown profile, which is slightly lower in available water within that depth. The soils, however, show marked differences in available water in the subsoil. The Hagerstown and Duffield soils (formed in limestone residuum) have the lowest available water in the subsoil of the six pedons given. Apparently, although the high clay content of these soils indicates that they probably hold the highest amounts of total water, less water is readily available for plant growth in the Hagerstown and Duffield soils than in the other pedons shown in figure 10. The Pequea and Letort soils (formed in residuum of metamorphic rocks) are intermediate in the available water of the subsoil among the six pedons shown. Although the data are limited for the amounts of available water in the subsoil of the Glenelg and Manor soils (formed in residuum of acid crystalline rocks) the data indicate that these soils have the highest amounts of available water in their subsoil.

### Soil Reaction

The reaction of the soil is one of the best indicators of the condition of the soil for plant growth. A neutral or slightly acid reaction in a soil is optimum for most plant growth in terms of nutrient availability and for earthworm

### AVAILABLE WATER IN THE SOIL

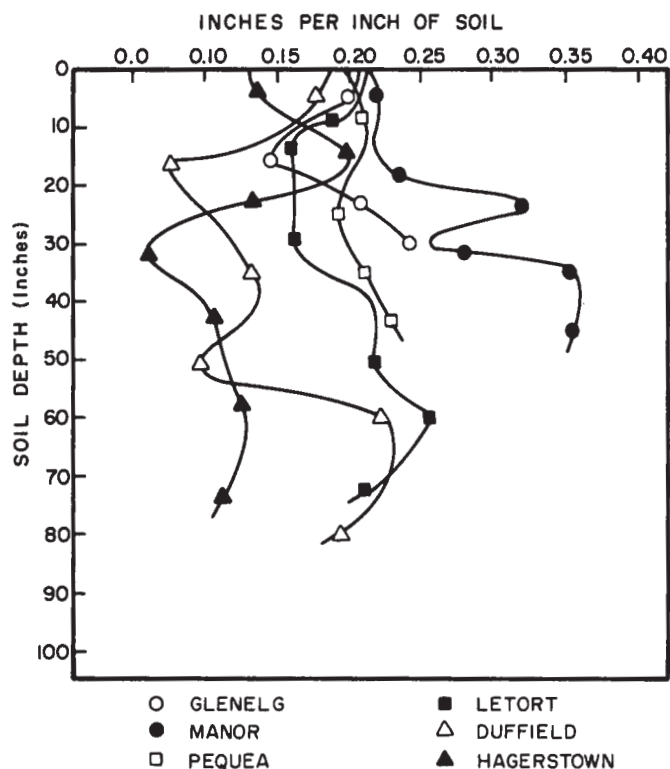


Figure 10.

and microbial activity. Figure 11 shows that at all depths all the pedons except Hagerstown have a pH value (in water) of between 5.8 and 7.4.

The natural weathering processes are more intense at the surface, and organic acids are generated in the surface horizon through the decomposition of surface plant residues. Thus, the pH values of uncultivated soils generally are lower at the surface and increase with depth. The data in figure 11, however, show a variability in pH values above a depth of 40 inches. The variability is mainly caused by the amount of lime applied to the soil and the length of time between the application of the lime and the sampling of the soil.

### Cation-Exchange Capacity

The cation-exchange capacity (CEC) of a soil is a measure of the ability of the soil to absorb and retain nutrients. This characteristic is closely related to the content of organic matter and clay in the soil. The organic matter content of the soil contributes most significantly to the CEC of the surface layer, and the clay

content is primarily responsible for the CEC of the subsoil horizons where the level of organic matter is low.

Figure 12 shows the relationship between depth and the CEC of the Glenelg, Manor, Pequea, Letort, Duffield, and Hagerstown soils. The data show that the CEC of the upper 6 inches of all of the pedons is similar, ranging mainly from 15 to 20 milliequivalents per 100 grams (meq/100g). The exceptions are the CEC of the Glenelg soil (11 meq/100g) and the Letort soil (22 meq/100g).

The CEC of the subsoil generally follows the trends of the clay content. The Glenelg and Manor soils have the lowest CEC in their subsoil, ranging from 10 meq/100g immediately below the surface to less than 4 meq/100g at a depth of more than 35 inches. The CEC values of the Letort soil, although highest of the six pedons at the surface, show a steady decrease in CEC to 4 meq/100g at a depth of 60 inches or more. The Pequea soil decreases in CEC from the surface to a depth of 20 inches and then increases to 17 meq/100g at a depth of 45 inches. The Duffield and Hagerstown soils show the effect of the high clay content in the subsoil by having the highest CEC of the six pedons.

#### SOIL pH

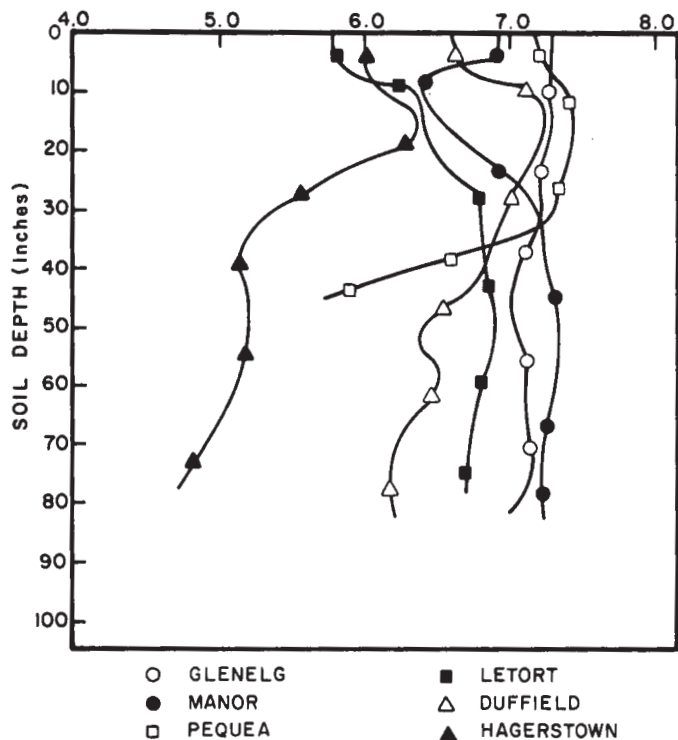


Figure 11.

#### CATION-EXCHANGE CAPACITY

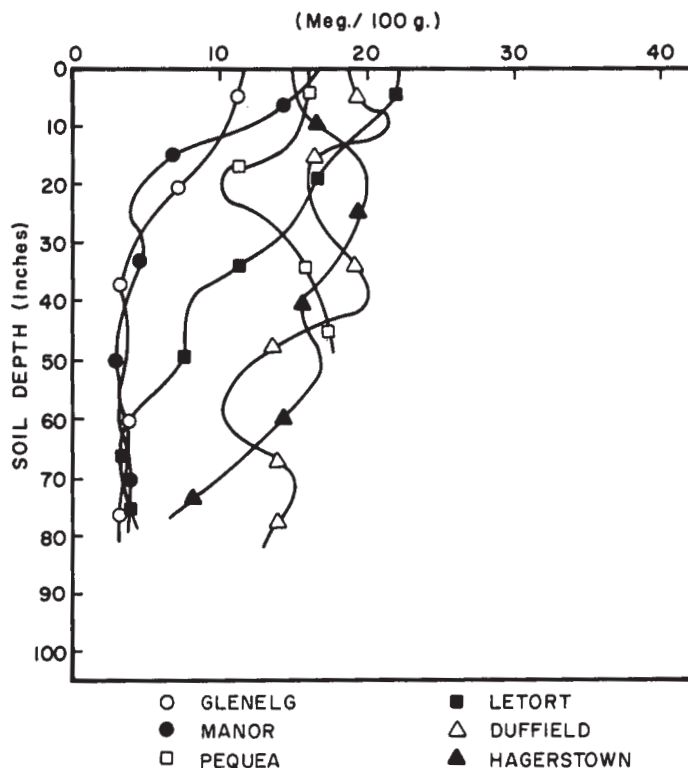


Figure 12.

#### Percent Base Saturation

When considering the nutrient status of a soil for plant growth, the proportion of basic cations on the exchange complex to acidic cations on the exchange is just as important as the cation-exchange capacity. This proportion, expressed as a percent, is the base saturation of the soil.

The basic cations, in order of their usual abundance, are magnesium (Mg), calcium (Ca), potassium (K), and small amounts of sodium (Na). The acidic cations are aluminum (Al) and hydrogen (H). The amounts of these cations in a soil influence their uptake by plant roots and, therefore, greatly influence the fertility of the soil. The base saturation indicates the degree and depth of leaching and thus is a strong indicator of the genetic processes that are occurring in the soil. Under natural conditions, basic cations are leached from the upper horizons into lower horizons, causing the base saturation of a soil to increase with depth. Nutrient recycling by plants offsets this process to some extent, and liming and fertilizing of the soils maintains a high base saturation status within the plant rooting zone.



## PERCENT BASE SATURATION

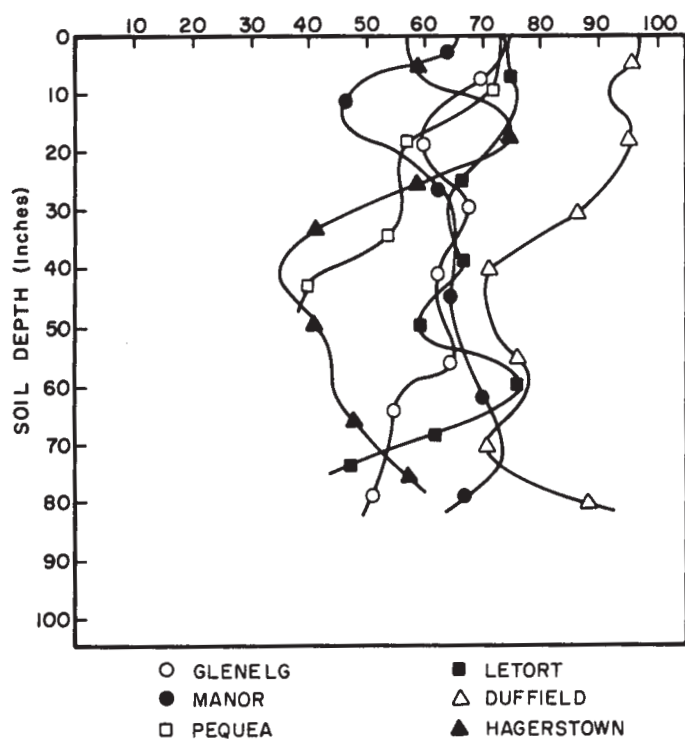


Figure 13.

The data in figure 13 show the relationship between depth and the percent base saturation for the Glenelg, Manor, Pequea, Letort, Duffield, and Hagerstown soils. Other data indicate that the percent base saturation to a depth of 40 inches was less in these soils prior to liming and fertilizing. The trends in base saturation for the six pedons do not seem to be related to the type of parent material (rock type), and the differences among the soils in base saturation may be caused dominantly by differences in agricultural management.

## Extractable Calcium

Figure 14 shows the relationship between the content of extractable calcium (Ca) and the depth of the Glenelg, Manor, Pequea, Letort, Duffield, and Hagerstown soils. The data further illustrate the effect of agricultural management practices on the soils of Lancaster County.

Liming results in the application of large amounts of calcium to the surface of a soil. Calcium, a fairly mobile cation, is moved down through the soil profile by weathering and leaching. The data in figure 14 show that all of the soils have been affected by the addition of calcium. Like the natural trend in percent base

saturation, the natural trend in calcium content is to increase with depth as a result of leaching and weathering; this process is offset somewhat by nutrient recycling by plants. However, all of these pedons show the result of liming: The levels of calcium content are higher near the surface and decrease with depth.

The Glenelg and Manor soils have a generally lower calcium content at the surface than the other soils, and the content decreases to about 1.5 meq/100g at a depth of 30 inches or more. The Pequea, Letort, Duffield, and Hagerstown soils show decreasing extractable calcium levels between depths of 15 and 60 inches. This is important from a soil taxonomic standpoint, as the data indicate the base saturation is being altered to a depth used to classify soils as Alfisols and Ultisols. The taxonomic classification of these soils therefore is changed in some fields because of liming practices.

## Summary

The soil characterization data for Lancaster County show that wide ranges in soil characteristics exist among some of the pedons sampled. Differences in such characteristics such as clay content, cation-exchange capacity, and available water-holding capacity cause the various soils to have significantly different potentials for different land uses. In some instances, management practices that have been applied to these soils to offset deficiencies in one characteristic (pH and base saturation) have resulted in changes in characteristics

## EXTRACTABLE CALCIUM

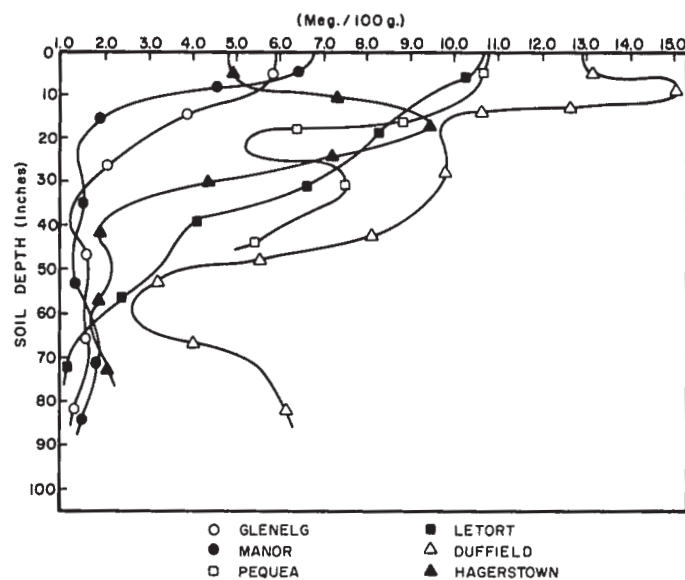


Figure 14.

that are significant for interpreting the genesis, classification, and use potential of the soils.

## Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. Some soils in table 17 are assigned to two hydrologic soil groups. Dual grouping is used for soils that have a seasonal high water table but that can be drained. The first letter applies to the drained condition of the soils and the second letter to the undrained condition.

*Flooding*, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years;

and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

*High water table* (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

*Potential frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent



collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as

soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (8). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties

and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Fluvaquents.

**SERIES.** The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (6). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (8). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Most areas of this county have been cleared and farmed for nearly two centuries. The soils have a long history of liming, primarily because of the availability of limestone rock in the county. Liming has increased the pH of most of the soils. This increase is throughout the soil profile, and for many soils the pH is higher than that defined for the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

### Abbottstown Series

The soils of the Abbottstown series are fine-loamy, mixed, mesic Aeric Fragiaqualls. They are deep and somewhat poorly drained and are in upland depressions and drainageways. They formed in residuum weathered



from red Triassic siltstone and sandstone. Slopes range from 3 to 8 percent.

Abbottstown soils are on the landscape with Bucks, Ungers, and Readington soils but have more gray in the subsoil than those soils.

Typical pedon of Abbottstown silt loam, 3 to 8 percent slopes, in a cultivated field in Rapho Township, 1 1/2 miles northwest of Mastersonville, 200 feet southwest of Cold Spring Road, and 1/2 mile northwest of the intersection of Cold Spring Road and Sunny Burn Road:

- Ap—0 to 10 inches; brown (7.5YR 4/2) silt loam; weak medium granular structure; friable, slightly sticky, nonplastic; 5 percent coarse fragments; neutral; abrupt smooth boundary.
- B21t—10 to 16 inches; reddish brown (5YR 5/3) silt loam; common medium faint yellowish red (5YR 5/6) and reddish gray (5YR 5/2) mottles; moderate coarse subangular blocky structure; friable, slightly sticky, nonplastic; 5 percent coarse fragments; few thin clay films on ped faces; medium acid; clear wavy boundary.
- B22tg—16 to 24 inches; reddish gray (5YR 5/2) silty clay loam; common medium distinct red (2.5YR 4/6) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, sticky, plastic; 5 percent coarse fragments; common thin clay films on ped faces; medium acid; clear wavy boundary.
- Bx—24 to 35 inches; reddish gray (5YR 5/2) silt loam; common medium distinct reddish brown (2.5YR 5/4) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; brittle, very firm, slightly sticky, slightly plastic; 10 percent coarse fragments; common thin clay films on ped faces; common black coatings; medium acid; clear wavy boundary.
- B3g—35 to 42 inches; reddish gray (5YR 5/2) gravelly silt loam; many medium distinct reddish brown (2.5YR 5/4) mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; 15 percent coarse fragments; medium acid; clear wavy boundary.
- C—42 to 60 inches; reddish brown (2.5YR 4/4) gravelly silt loam; few fine distinct light reddish brown (5YR 6/3) mottles; massive; friable, slightly sticky, nonplastic; 15 percent coarse fragments; medium acid.

The solum thickness ranges from 30 to 60 inches. The depth to bedrock is 40 inches or more, and the depth to the fragipan ranges from 15 to 30 inches. Coarse fragments make up 0 to 15 percent of the upper part of the solum and from 10 to 30 percent of the lower part of the solum and the C horizon. Reaction ranges from very strongly acid to neutral in the A horizon and upper part of the B horizon and from strongly acid to neutral in the Bx and C horizons.

The A horizon has hue of 2.5YR through 10YR, value of 3 through 4, and chroma of 2 through 4. The fine-earth texture is silt loam or loam.

The upper part of the B horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 3 or 4. The lower part has value of 4 through 6 and chroma of 1 or 2. The fine-earth texture is silt loam, clay loam, or silty clay loam.

The Bx horizon is neutral or has hue of 10R through 5YR, value of 4 or 5, and chroma of 0 through 4. The fine-earth texture is loam or silt loam.

The C horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 2 through 6. The fine-earth texture is loam or silt loam.

## Baile Series

The soils of the Baile series are fine-loamy, mixed, mesic Typic Ochraquults. They are deep and poorly drained and are in upland depressions and drainageways. They formed in local alluvium over residuum weathered from mica schist and granitized schist. Slopes range from 0 to 5 percent.

Baile soils are on the landscape with Glenville, Chester, Manor, and Glenelg soils. The Glenville soils are moderately well drained and somewhat poorly drained, and the Chester, Manor, and Glenelg soils are well drained.

Typical pedon of Baile silt loam, in a pasture in Salisbury Township, 3 miles north of Cain, 500 feet east of Churchtown Road and 200 feet north of the intersection of Churchtown Road and the creek:

- Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine roots; neutral; clear wavy boundary.
- B1g—10 to 16 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, nonplastic; neutral; clear wavy boundary.
- B21tg—16 to 20 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common moderately thick clay films on ped faces and in pores; 5 percent coarse fragments; neutral; clear wavy boundary.
- B22tg—20 to 30 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; common moderately thick clay films on ped faces and in pores; 5 percent coarse fragments; neutral; clear wavy boundary.

B23tg—30 to 40 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak thick platy structure; very firm, nonsticky, nonplastic; common clay films on plates; 5 percent coarse fragments; neutral; clear wavy boundary.

Cg—40 to 60 inches; gray (10YR 5/1) loam; few fine distinct strong brown (7.5YR 5/6) mottles; massive; firm, nonsticky, nonplastic; 10 percent coarse fragments; neutral.

The solum thickness ranges from 30 to 40 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 10 percent throughout. Reaction ranges from medium acid to neutral throughout.

The A horizon is neutral or has hue of 10YR through 5Y, value of 2 through 6, and chroma of 0 through 2. The fine-earth texture is silt loam, loam, or silty clay loam.

The B horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2. The fine-earth texture is silt loam, clay loam, or silty clay loam.

The C horizon is neutral or has hue of 7.5YR through 5Y, value of 2 through 5, and chroma of 0 through 2. The fine-earth texture is loam or sandy loam.

## Bedington Series

The soils of the Bedington series are fine-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on dissected ridgetops and side slopes. They formed in residuum weathered from acid shale or interbedded shale, siltstone, and sandstone. Slopes are 0 to 25 percent.

Bedington soils are on the landscape with Blairton, Duffield, and Hagerstown soils. The Bedington soils are better drained than the Blairton soils and are coarser textured in the subsoil than the Hagerstown soils. The Bedington soils formed in acid parent material, whereas the Duffield soils formed in limestone parent material.

Typical pedon of Bedington silt loam, 3 to 8 percent slopes, in a hayfield in Penn Township, 3 miles west of Lititz and 75 feet south of the intersection of Sego-Sago and Fairland Crossroads:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium granular structure; friable, slightly sticky, nonplastic; 10 percent coarse fragments; slightly acid; abrupt wavy boundary.

B1—9 to 12 inches; strong brown (7.5YR 5/6) channery silt loam; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; 15 percent coarse fragments; slightly acid; clear wavy boundary.

B21t—12 to 32 inches; strong brown (7.5YR 5/8) channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly

plastic; common clay films on peds; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B22t—32 to 53 inches; yellowish red (5YR 5/8) very channery loam; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; many thin clay films on peds; common black coats on peds; 40 percent coarse fragments; very strongly acid; clear wavy boundary.

B3—53 to 60 inches; yellowish brown (10YR 5/6) very channery loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; many black coats on peds; 60 percent coarse fragments; very strongly acid; clear wavy boundary.

C—60 to 77 inches; yellowish brown (10YR 5/6) extremely channery silt loam; massive; firm, slightly sticky, nonplastic; 70 percent coarse fragments; very strongly acid; clear wavy boundary.

R—77 inches; brownish yellow (10YR 6/6) acid shale.

The solum thickness ranges from 40 to 70 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 5 to 40 percent in the upper part of the solum, from 20 to 80 percent in the lower part of the solum, and up to 90 percent in the C horizon. Reaction ranges from very strongly acid to neutral throughout.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam or loam.

The B horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. The fine-earth texture is loam, silt loam, silty clay loam, or clay loam.

The C horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. The fine-earth texture is loam, silt loam, silty clay loam, or clay loam.

## Blairton Series

The soils of the Blairton series are fine-loamy, mixed, mesic Aquic Hapludults. They are moderately deep, are somewhat poorly drained and moderately well drained, and are on upland concave slopes and in drainageways. They formed in residuum weathered from acid, brown and olive siltstone and sandstone. Slopes range from 3 to 10 percent.

Blairton soils are on the landscape with well drained Bedington soils.

Typical pedon of Blairton silt loam, 3 to 10 percent slopes, in a pasture in Rapho Township, 2 miles west of Manheim and 450 feet northeast of the intersection of Fairview and Hossler Roads:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; 10 percent coarse fragments; neutral; abrupt smooth boundary.



- B21t—10 to 18 inches; brown (10YR 5/3) silt loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on ped faces; 10 percent coarse fragments; medium acid; clear wavy boundary.
- B22—18 to 27 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct light gray (2.5Y 7/2) mottles; moderate coarse subangular blocky structure; friable, sticky, slightly plastic; common thin clay films on ped faces and in pores; 10 percent coarse fragments; medium acid; clear wavy boundary.
- B3g—27 to 35 inches; light brownish gray (2.5Y 6/2) channery silt loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; 30 percent coarse fragments; strongly acid; clear wavy boundary.
- Cg—35 to 39 inches; light brownish gray (2.5Y 6/2) channery loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; firm, slightly sticky, nonplastic; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.
- R—39 inches; brown (10YR 5/3) shale bedrock.

The solum thickness and depth to bedrock range from 20 to 40 inches. The content of coarse fragments ranges from 5 to 30 percent in the Ap horizon, from 5 to 50 percent in the individual horizons of the Bt horizon, and from 30 to 90 percent in the B3 and C horizons. Reaction ranges from very strongly acid to neutral throughout.

The Ap horizon has hue of 7.5YR through 2.5Y, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is loam or silt loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 2 through 8. The fine-earth texture is loam, silt loam, or silty clay loam.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 2 through 8. The fine-earth texture is loam or silt loam.

## Bowmansville Series

The soils of the Bowmansville series are fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents. They are deep, are poorly drained and somewhat poorly drained, and formed in mixed alluvial material deposited by streams. Slopes range from 0 to 3 percent.

Bowmansville soils are on the landscape with Rowland and Holly soils. The Rowland soils are moderately well drained and somewhat poorly drained. The Bowmansville soils have more red in the B horizon than the Holly soils.

Typical pedon of Bowmansville silt loam, in a pasture in Cocalico Township, 2 miles northwest of Denver, 200 feet southeast of Swamp Road, at Cocalico Creek:

- Ap—0 to 7 inches; reddish brown (5YR 4/4) silt loam; weak medium granular structure; friable, slightly sticky, slightly plastic; strongly acid; abrupt smooth boundary.
- B21—7 to 16 inches; reddish brown (5YR 5/4) silt loam; common fine distinct pinkish gray (7.5YR 6/2) and reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, sticky, slightly plastic; strongly acid; clear wavy boundary.
- B22g—16 to 26 inches; pinkish gray (7.5YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; strongly acid; clear wavy boundary.
- B23g—26 to 35 inches; pinkish gray (5YR 6/2) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; strongly acid; clear wavy boundary.
- Clg—35 to 52 inches; pinkish gray (7.5YR 6/2) sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak thick platy structure parting to weak medium subangular blocky; friable, slightly sticky, slightly plastic; strongly acid; clear wavy boundary.
- IIC2g—52 to 66 inches; variegated pinkish gray (7.5YR 6/2) and strong brown (7.5YR 5/8) stratified sand and gravel; single grain; loose, nonsticky, nonplastic; strongly acid.

The solum thickness ranges from 24 to 40 inches. The depth to stratified sand and gravel is more than 40 inches, and the depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the solum, from 0 to 30 percent in the C horizon, and from 10 to 90 percent in the IIC horizon. Reaction ranges from strongly acid to neutral throughout.

The A horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or sandy loam.

The B horizon has hue of 5YR or 7.5YR, value of 3 through 6, and chroma mainly of 2. At least one subhorizon has chroma of 3 or 4. The fine-earth texture is silt loam, loam, sandy loam, silty clay loam, or sandy clay loam.

The C horizon has hue of 5YR or 7.5YR, value of 3 through 6, and chroma of 2. The fine-earth texture is silty clay loam through sandy loam.

The IIC horizon has hue of 5YR or 7.5YR, value of 3 through 6, and chroma of 1 or 2 and is stratified sand and gravel.

## Brecknock Series

The soils of the Brecknock series are fine-loamy, mixed, mesic Ultic Hapludalfs. They are deep and well drained and are on convex slopes on uplands. They

formed in residuum weathered from metamorphosed siltstone and sandstone. Slopes range from 3 to 25 percent.

Brecknock soils are associated with Bucks, Ungers, Mount Lucas, and Lehigh soils. The Brecknock soils do not have the red hues and the high chroma typical of the Bucks and Ungers soils and are better drained than the Mount Lucas or Lehigh soils.

Typical pedon of Brecknock gravelly silt loam, in a wooded area of Brecknock very stony silt loam, 8 to 25 percent slopes, Mount Joy Township, 2.5 miles northeast of Mastersonville, 1.3 miles west of the intersection of Camp Road and Pinch Road, 50 feet east and 600 feet north of the intersection of a logging road and Camp Road:

- O1—1 inch to 0; partially decomposed organic material.
- A1—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; weak very fine granular structure; friable, nonsticky, nonplastic; 20 percent coarse fragments; medium acid; abrupt smooth boundary.
- A2—2 to 8 inches; dark gray (10YR 4/1) gravelly silt loam; weak fine granular structure; friable, nonsticky, nonplastic; 20 percent coarse fragments; medium acid; clear wavy boundary.
- B21t—8 to 18 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on ped faces and in pores; 15 percent coarse fragments; very strongly acid; gradual wavy boundary.
- B22t—18 to 30 inches; dark grayish brown (10YR 4/2) gravelly silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; many thin clay films on ped faces and in pores; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
- B3—30 to 38 inches; grayish brown (2.5Y 5/2) gravelly silt loam; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; 30 percent coarse fragments; very strongly acid; clear smooth boundary.
- C—38 to 56 inches; dark gray (10YR 4/1) very gravelly loam; massive; firm, slightly sticky, slightly plastic; 40 percent coarse fragments; very strongly acid.
- R—56 inches; very dark gray (10YR 3/1) porcelanite bedrock.

The solum thickness ranges from 24 to 40 inches. The depth to bedrock ranges from 40 to 60 inches. The content of coarse fragments ranges from 5 to 30 percent in the solum and from 15 to 70 percent in the C horizon. Reaction is very strongly acid to medium acid throughout.

The A horizon has hue of 10YR through 2.5Y, value of 2 through 4, and chroma of 1 through 3. Value of 2 and chroma of 1 are limited to undisturbed pedons. The fine-earth texture is loam or silt loam.

The B horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 2 or 3. The fine-earth texture is loam, silt loam, clay loam, or silty clay loam.

The C horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 1 through 3. The fine-earth texture is loam, silt loam, or clay loam.

## Bucks Series

The soils of the Bucks series are fine-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on broad ridgetops and side slopes. They formed in residuum weathered from red Triassic shale, siltstone, and sandstone. Slopes range from 0 to 25 percent.

Bucks soils are on the landscape with Ungers, Abbottstown, Lehigh, Lansdale, Brecknock, and Readington soils. The Abbottstown, Lehigh, and Readington have mottles in the B horizon, and the Bucks soils have more silt and less sand in the B horizon than the Ungers or Lansdale soils.

Typical pedon of Bucks silt loam, 3 to 8 percent slopes, in a hayfield in East Cocalico Township, 1 1/2 miles northwest of Denver, 1/2 mile north of the intersection of Wallops Hill Road and Steinmetz Road, and 500 feet northwest of Wallops Hill Road:

- Ap—0 to 6 inches; reddish brown (5YR 5/4) silt loam; moderate medium granular structure; friable, slightly sticky, nonplastic; medium acid; clear wavy boundary.
- B21t—6 to 18 inches; weak red (10R 4/4) silty clay loam; strong coarse subangular blocky structure; friable, slightly sticky, plastic; few thin clay films lining pores and on ped faces; medium acid; clear wavy boundary.
- B22t—18 to 30 inches; red (2.5YR 4/6) silty clay loam; strong very coarse prismatic structure parting to moderate coarse subangular blocky; firm, sticky, plastic; few thin clay films lining pores and on ped faces; very strongly acid; gradual wavy boundary.
- B3—30 to 40 inches; weak red (10R 4/4) gravelly silty clay loam; weak coarse subangular blocky structure; friable, sticky, slightly plastic; many medium black stains and coats on ped faces; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.
- C—40 to 52 inches; weak red (10R 4/4) gravelly silty clay loam; massive; firm, slightly sticky, plastic; 40 percent coarse fragments; very strongly acid.
- R—52 inches; weak red (10R 4/4) siltstone bedrock.

The solum thickness ranges from 30 to 40 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 0 to 5 percent in the upper part of the solum, from 5 to 30 percent in the lower part of the solum, and from 10 to 50 percent in the



C horizon. Reaction is very strongly acid to medium acid throughout.

The Ap horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 2 through 4.

The B horizon has hue of 7.5YR through 10R, value of 3 through 5, and chroma of 3 through 6. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 7.5YR through 10R, value of 3 through 5, and chroma of 3 through 6. The fine-earth texture is silt loam or silty clay loam.

## Chester Series

The soils of the Chester series are fine-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on broad, dissected ridgetops and side slopes. They formed in residuum weathered from mica schist and quartzite. Slopes are 0 to 15 percent.

Chester soils are on the landscape with Clymer, Glenelg, Manor, Glenville, and Bile soils. The Chester soils have a thicker solum than the Glenelg or Manor soils, are better drained than the Glenville or Baile soils, and have more silt and less sand in the subsoil than the Clymer soils.

Typical pedon of Chester silt loam, 8 to 15 percent slopes, in a cultivated field in Salisbury Township, 3 miles north of the intersection of Churchtown Road and State Route 340, 300 feet west of Churchtown Road:

- Ap—0 to 10 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; 5 percent coarse fragments; neutral; abrupt smooth boundary.
- B1—10 to 14 inches; strong brown (7.5YR 5/6) silt loam; moderate fine subangular blocky structure; friable, nonsticky, nonplastic; common black coatings; 5 percent coarse fragments; slightly acid; clear wavy boundary.
- B2t—14 to 26 inches; yellowish red (5YR 5/8) silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common moderately thick clay films on ped faces; common black coatings; few mica flakes; 5 percent coarse fragments; slightly acid; gradual wavy boundary.
- B22t—26 to 39 inches; yellowish red (5YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; common moderately thick clay films on ped faces; common black coatings; many mica flakes; 5 percent coarse fragments; slightly acid; clear wavy boundary.
- B3—39 to 43 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; firm, nonsticky, nonplastic; common black coatings; many mica flakes; 5 percent coarse fragments; slightly acid; clear wavy boundary.

C—43 to 60 inches; variegated dark brown (7.5YR 4/4) and strong brown (7.5YR 5/8) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; many mica flakes; medium acid.

The solum thickness ranges from 30 to 50 inches, and the depth to the base of the argillic horizon ranges from 30 to 40 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from about 0 to 25 percent throughout. Reaction is strongly acid to neutral throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth texture is silt loam or loam.

The B horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 3 through 8. The higher chromas commonly are associated with the redder hue. The fine-earth texture in the B2 and B3 horizons is silt loam, loam, clay loam, or silty clay loam.

The C horizon has hue of 7.5YR through 5YR, value of 4 through 6, and chroma of 4 through 8. The fine-earth texture is loam or silt loam.

## Clarksburg Series

The soils of the Clarksburg series are fine-loamy, mixed, mesic Typic Fragiudalfs. They are deep and moderately well drained and are in depressions and broad drainageways in valleys. They formed in colluvium or residuum weathered from limestone and some siltstone. Slopes range from 0 to 5 percent.

Clarksburg soils are on the landscape with Hagerstown, Duffield, Conestoga, Hollinger, Letort, and Penlaw soils. The Hagerstown, Duffield, Letort, Hollinger, and Conestoga soils are well drained, and the Penlaw soils are somewhat poorly drained.

Typical pedon of Clarksburg silt loam, 0 to 5 percent slopes, in a cultivated field in Penn Township, 1.5 miles south of Manheim, 2 miles north of the intersection of Power Road and Auction Road, and 300 feet west of Power Road:

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular and moderate medium subangular blocky structure; very friable, slightly sticky, slightly plastic; mildly alkaline; abrupt smooth boundary.
- B21t—9 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; moderate coarse subangular blocky structure; firm, sticky, plastic; thick continuous clay films on peds and in pores; mildly alkaline; clear wavy boundary.
- Bx1—22 to 33 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak thin platy; very firm and brittle, sticky, plastic; thin continuous

clay films on peds and in pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

Bx2—33 to 52 inches; yellowish brown (10YR 5/6) silty clay loam; common distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm and brittle, sticky, plastic; thin continuous clay films in pores and on ped faces; 5 percent coarse fragments; neutral; gradual wavy boundary.

C—52 to 60 inches; strong brown (7.5YR 5/8) gravelly silty clay loam; common distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure; firm, sticky, plastic; 15 percent coarse fragments; neutral.

The solum thickness ranges from 40 to 70 inches. The depth to the fragipan ranges from 20 to 36 inches. and the depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 20 percent in the horizons above the fragipan, from 5 to 30 percent in the fragipan, and from 5 to 80 percent in the C horizon. Reaction is medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. The fine-earth texture is silty clay loam, silt loam, loam, or clay loam.

The Bx horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 8. The fine-earth texture ranges from silt to clay.

## Clymer Series

The soils of the Clymer series are fine-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on ridgetops and side slopes. They formed from residuum weathered from sandstone and quartzite. Slopes are 3 to 50 percent.

Clymer soils are on the landscape with Chester and Glenelg soils but have more sand and less silt in the subsoil than the Chester or Glenelg soils.

Typical pedon of Clymer channery loam, in an area of Clymer very stony loam, 3 to 8 percent slopes, in a wooded area in East Earl Township, 3.2 miles southeast of Blue Ball and 50 feet south of the intersection of Meeting House and Sandmine Road:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine granular structure; friable, nonsticky, nonplastic; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) channery loam; weak medium granular structure; friable,

nonsticky, nonplastic; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B1—7 to 10 inches; brownish yellow (10YR 6/6) channery sandy loam; weak fine subangular blocky structure; friable, nonsticky, nonplastic; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B21t—10 to 17 inches; brownish yellow (10YR 6/6) channery sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on ped faces and in pores; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

B22t—17 to 27 inches; strong brown (7.5YR 5/6) channery sandy clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; common thin clay films on ped faces and in pores; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

C1—27 to 38 inches; yellowish brown (10YR 5/6) very channery loam; massive; friable, nonsticky, nonplastic; 50 percent coarse fragments; very strongly acid; clear wavy boundary.

C2—38 to 60 inches; light yellowish brown (10YR 6/4) extremely channery sandy loam; massive; friable, nonsticky, nonplastic; 60 percent coarse fragments; very strongly acid.

The solum thickness ranges from 24 to 40 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 5 to 40 percent in the solum and from 20 to 85 percent in the C horizon. Reaction ranges from extremely acid to strongly acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The A2 horizon has hue of 10YR, value of 5, and chroma of 1 through 8. The fine-earth texture is loam, sandy loam, or silt loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 4 through 8. The fine-earth texture is loam, sandy loam, sandy clay loam, or clay loam.

The C horizon has hue of 7.5YR or 10YR and value and chroma of 4 through 6. The fine-earth texture is loam or sandy loam.

## Comus Series

The soils of the Comus series are coarse-loamy, mixed, mesic Fluventic Dystrochrepts. They are deep and well drained and are on flood plains. They formed in alluvium from residuum weathered from mica schist and granitized schist. Slopes are 0 to 3 percent.

Comus soils are on the landscape with Newark and Holly soils on flood plains. The Newark soils are



somewhat poorly drained, and the Holly soils are poorly drained.

Typical pedon of Comus silt loam, in a pasture in Fulton Township, 1.2 miles east of Black Baron, 350 feet northeast of the intersection of Conowingo Creek and Mason Dixon Road:

- Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silt loam; weak coarse granular structure; friable, slightly sticky, slightly plastic; slightly acid; abrupt smooth boundary.
- B21—12 to 21 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium granular structure; friable, slightly sticky, slightly plastic; medium acid; abrupt smooth boundary.
- B22—21 to 39 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; medium acid; abrupt wavy boundary.
- C1—39 to 48 inches; pale brown (10YR 6/3) loam; massive; friable, slightly sticky, slightly plastic; medium acid; clear wavy boundary.
- C2—48 to 60 inches; pale brown (10YR 6/3) sandy loam; many medium prominent yellowish red (5YR 4/6) mottles; massive; loose, nonsticky, nonplastic; medium acid.

The solum thickness ranges from 24 to 40 inches. Bedrock is at a depth of more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the solum and from 0 to 40 percent in the C horizon. Reaction is strongly acid to slightly acid throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 1 through 4. The fine-earth texture is silt loam, loam, or fine sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. The fine-earth texture is loam, silt loam, or fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 6. The fine-earth texture is loam, fine sandy loam, or loamy sand.

## Conestoga Series

The soils of the Conestoga series are fine-loamy, mixed, mesic Typic Hapludalfs. They are deep and well drained and are on broad uplands, ridgetops, and side slopes. They formed in material weathered from micaceous limestone and calcareous schist. Slopes are 0 to 15 percent.

Conestoga soils are on the landscape with Hollinger, Penlaw, Pequea, and Clarksburg soils. The Hollinger and Pequea soils have a thinner solum than the Conestoga soils. The Clarksburg soils are moderately well drained, and the Penlaw soils are somewhat poorly drained.

Typical pedon of Conestoga silt loam, 0 to 3 percent slopes, in a cultivated field in Paradise Township, 1.25 miles east of Strasburg, 2,500 feet north of the

intersection of State Route 741 and Esbenshade Road, 200 feet west of Esbenshade Road:

- Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.
- B21t—10 to 27 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; common distinct clay films on ped faces and in pores; neutral; gradual wavy boundary.
- B22t—27 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; moderate coarse subangular blocky structure; firm, slightly sticky, slightly plastic; many distinct clay films on ped faces and in pores; neutral; clear wavy boundary.
- C1—38 to 60 inches; variegated yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6) channery loam; massive; firm, nonsticky, nonplastic; 15 percent coarse fragments; neutral; gradual wavy boundary.
- C2—60 to 75 inches; light olive brown (2.5Y 5/6) channery loam; massive; firm, nonsticky, nonplastic; 25 percent coarse fragments; neutral.

The solum thickness ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the A horizon, 0 to 30 percent in the B horizon, and 10 to 35 percent in the C horizon. Reaction ranges from very strongly acid to neutral in the A horizon, strongly acid to medium acid in the B horizon, and medium acid to mildly alkaline in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The fine-earth texture is loam or silt loam.

The B horizon mainly has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 through 8. Some pedons have a subhorizon with hue of 2.5Y, value of 5 or 6, and chroma of 4 through 8. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 4 through 8. The fine-earth texture is sandy loam, loam, or silt loam.

## Duffield Series

The soils of the Duffield series are fine-loamy, mixed, mesic Ultic Hapludalfs. They are deep and well drained and are on undulating slopes of limestone valleys on uplands. They formed in residuum weathered from limestone. Slopes are 0 to 8 percent.

Duffield soils are on the landscape with Elk, Hagerstown, Clarksburg, and Penlaw soils. The Duffield soils have less silt and more sand in the solum than the Elk soils and have a yellower hue and contain less clay in the subsoil than the Hagerstown soils. The Clarksburg

soils are moderately well drained, and the Penlaw soils are somewhat poorly drained.

Typical pedon of Duffield silt loam, 3 to 8 percent slopes, in a cultivated field in Penn Township, 1 mile west of Lititz, 600 feet northwest of Longenecker Road and 0.3 mile south of the intersection of Longenecker Road and Temperance Hill Road:

- Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.
- B21t—10 to 17 inches; dark yellowish brown (10YR 4/6) silty clay loam; weak medium subangular blocky structure; friable, slightly sticky, plastic; few thin clay films on peds and in pores; neutral; clear wavy boundary.
- B22t—17 to 30 inches; yellowish brown (10YR 5/8) silty clay loam; weak medium subangular blocky structure; firm, slightly sticky, plastic; few thin clay films on peds and in pores; neutral; clear wavy boundary.
- B23t—30 to 45 inches; strong brown (7.5YR 5/8) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky, plastic; few thin clay films and many black coatings on ped faces; neutral; clear wavy boundary.
- B24t—45 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium coarse subangular blocky structure; firm, slightly sticky, plastic; many moderately thick clay films and a few black coatings on peds; 10 percent coarse fragments; neutral.

The solum thickness ranges from 40 to 70 inches. The argillic horizon is at a depth of more than 40 inches. The depth to bedrock is more than 48 inches. The content of coarse fragments ranges from 0 to 20 percent in the solum. Reaction ranges from medium acid to neutral throughout.

The Ap horizon has hue of 10YR to 7.5YR, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or silty clay loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. The fine-earth texture is silt loam, loam, silty clay loam, or silty clay.

## Elk Series

The soils of the Elk series are fine-silty, mixed, mesic Ultic Hapludalfs. They are deep and well drained and are on stream terraces. They formed in mixed old alluvium from materials weathered from shale, limestone, siltstone, and sandstone. Slopes range from 0 to 15 percent.

Elk soils are on the landscape with Duffield, Hagerstown, and Newark soils. The Elk soils have more silt and less sand in the solum than the Duffield soils and have less clay than the Hagerstown soils. The Newark soils are somewhat poorly drained.

Typical pedon of Elk silt loam, 0 to 3 percent slopes, in a hayfield in Marietta Borough, 50 feet north and 20 feet west of the intersection of Donegal School Road and North Chestnut Street:

- Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.
- B21t—10 to 29 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; neutral; gradual smooth boundary.
- B22t—29 to 48 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few small black concretions; slightly acid; clear smooth boundary.
- C—48 to 62 inches; strong brown (7.5YR 5/6) silty clay loam; massive; friable; few small black concretions; strongly acid.

The solum thickness ranges from 40 to 54 inches. The depth to bedrock is more than 60 inches. The reaction ranges from very strongly acid through neutral throughout. Some pedons have mottles with chroma of 2 or less below a depth of 30 inches.

The Ap has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or silty clay loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. The fine-earth texture is silt loam or silty clay loam.

## Fluvaquents

Fluvaquents have characteristics that are too variable for classification at the series level. The soils are moderately deep and deep and are somewhat poorly drained and poorly drained. They are on flood plains. They are a heterogeneous mixture of recently deposited alluvium or alluvium that has been altered by man. Slopes range from 0 to 3 percent.

Fluvaquents are on the landscape with Udifluvents and Holly, Lindsides, Newark, and Linden soils. The Udifluvents and Linden soils are well drained, and the Lindsides soils are moderately well drained. The Fluvaquents have less distinct horizon development than the Holly or Newark soils. Because of the variability of Fluvaquents, a typical pedon is not described.

The depth to bedrock is more than 20 inches. The content of coarse fragments ranges from 5 to 75 percent in individual subhorizons. The soils are very strongly acid to neutral throughout.

The A horizon has hue of 7.5YR through 2.5Y, value of 2 through 5, and chroma of 2 through 4. The fine-earth texture is sandy loam to silt loam.



The C horizon is neutral or has hue of 7.5YR through 5Y, value of 3 through 6, and chroma of 0 through 3, and it is mottled. The fine-earth texture ranges mainly from sandy loam to silt loam. Some pedons have layers of sand or sandy loam. The C horizon typically is stratified.

## Glenelg Series

The soils of the Glenelg series are fine-loamy, mixed, mesic Typic Hapludalfs. They are deep and well drained and are on broad ridgetops and side slopes and dissected upland ridges. They formed in residuum weathered from mica schist and quartzite. Slopes range from 3 to 25 percent.

Glenelg soils are on the landscape with Chester, Glenville, Baile, Manor, and Clymer soils. The Glenelg soils have a thinner solum than the Chester soils and have more silt and less sand in the subsoil than the Clymer soils. The Manor soils do not have an argillic horizon, the Glenville soils are moderately well drained and somewhat poorly drained, and the Baile soils are poorly drained.

Typical pedon of Glenelg silt loam, 3 to 8 percent slopes, in a cultivated area in Little Britain Township, 0.7 mile east of Kirk's Mills and 300 feet south of Slab Roe Road:

- Ap—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; 5 percent coarse fragments; neutral; abrupt smooth boundary.
- B21t—8 to 16 inches; strong brown (7.5YR 5/6) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many thin clay films on ped faces and in pores; 5 percent coarse fragments; neutral; clear wavy boundary.
- B22t—16 to 22 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; many moderately thick clay films on ped faces and in pores; 5 percent coarse fragments; neutral; clear wavy boundary.
- C1—22 to 40 inches; variegated reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/8) loam; massive; very friable; 10 percent coarse fragments; neutral; gradual wavy boundary.
- C2—40 to 60 inches; variegated reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/8) fine sandy loam; massive; very friable; 10 percent coarse fragments; medium acid.

The solum thickness ranges from 18 to 28 inches, and depth to bedrock is more than 48 inches. Reaction is very strongly acid to neutral throughout. The content of coarse fragments ranges from 0 to 20 percent throughout.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4. The fine-earth texture is loam or silt loam.

The B horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 8. The fine-earth texture is loam, silt loam, or silty clay loam.

The C horizon has hue of 2.5YR through 10YR, value of 4 through 6, and chroma of 2 through 8. The fine-earth texture is loam or fine sandy loam.

## Glenville Series

The soils of the Glenville series are fine-loamy, mixed, mesic Aquic Fragiudults. They are deep and moderately well drained and somewhat poorly drained and are at the heads of drainageways and on lower slopes of ridges. They formed in residuum weathered from mica schist, granitized schist, and mica gneiss. Slopes range from 3 to 8 percent.

Glenville soils are on the landscape with Chester, Glenelg, Manor, and Baile soils. The Glenville soils are better drained than the Baile soils. The Glenville soils have a mottled subsoil and a fragipan; the Chester, Glenelg, and Manor soils are not mottled and do not have a fragipan.

Typical pedon of Glenville silt loam, 3 to 8 percent slopes, in a pasture in Fulton Township, 500 feet west of U.S. Route 222 and 0.3 mile north of Bethel Church:

- Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate medium and coarse subangular blocky structure; friable, slightly sticky, nonplastic; medium acid; clear wavy boundary.
- B2t—9 to 15 inches; yellowish brown (10YR 5/6) silt loam; common fine faint very pale brown (10YR 7/4) and dark yellowish brown (10YR 4/4) mottles; moderate medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; thin clay films in pores, patchy on ped faces; medium acid; abrupt wavy boundary.
- Bx1—15 to 30 inches; yellowish brown (10YR 5/4) silt loam; many fine faint light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; common distinct light gray (N 7/0) mottles on prism faces; moderate very coarse prismatic structure parting to weak medium platy; very firm, slightly brittle, slightly plastic; common thin clay films on ped faces and in pores; medium acid; clear wavy boundary.
- Bx2—30 to 38 inches; yellowish brown (10YR 5/4) silt loam; many fine faint light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure parting to weak medium platy; very firm, brittle, slightly sticky, plastic; common thin clay films on ped faces and in pores; thick continuous oxide coatings on peds; slightly acid; clear wavy boundary.

B3—38 to 48 inches; strong brown (7.5YR 5/8) silt loam; common medium prominent light gray (N 7/0) mottles; moderate very thick platy structure; friable, nonsticky, nonplastic; few oxide coatings on ped faces; thin clay films in pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

C—48 to 62 inches; strong brown (7.5YR 5/8) loam; high content of mica; weak thin platy structure; friable, nonsticky, nonplastic; 15 percent coarse fragments; neutral.

The solum thickness ranges from 30 to 48 inches. The depth to bedrock is more than 60 inches, and the depth to the fragipan is 15 to 30 inches. The content of coarse fragments ranges from 0 to 30 percent in the solum and from 5 to 80 percent in the C horizon. Reaction is strongly acid to neutral throughout.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 6. It is silt loam, loam, or fine sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 8. It is loam, silt loam, clay loam, or silty clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6, and it is mottled. It is loam or silt loam.

The C horizon has hue of 2.5YR through 10YR, value of 4 through 6, and chroma of 1 through 8. It is loam or sandy loam.

### Hagerstown Series

The soils of the Hagerstown series are fine, mixed, mesic Typic Hapludalfs. They are deep and well drained and are on low hills and in valleys. They formed in residuum weathered from limestone. Slopes range from 0 to 30 percent.

Hagerstown soils are on the landscape with Duffield, Bedington, Elk, Penlaw, and Clarksburg soils. The Hagerstown soils have more clay in the subsoil than those soils and are better drained than the Clarksburg or Penlaw soils.

Typical pedon of Hagerstown silt loam, 0 to 3 percent slopes, in a cultivated field in Penn Township, 2 miles southwest of the intersection of Lititz Road and Erb's Road, 500 feet east of Erb's Road:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; slightly acid; abrupt smooth boundary.

B21t—10 to 20 inches; yellowish red (5YR 4/6) silty clay loam; weak medium blocky structure; friable, slightly sticky, slightly plastic; common thin clay films in pores; 5 percent coarse fragments; neutral; clear wavy boundary.

B22t—20 to 30 inches; red (2.5YR 4/8) clay; moderate medium blocky structure; firm, sticky, plastic; many

thin clay films in pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

B23t—30 to 52 inches; strong brown (7.5YR 5/6) silty clay; weak medium blocky structure; friable, sticky, plastic; many thin clay films in pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

B24t—52 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium blocky structure; friable, sticky, plastic; few thin clay films in pores and on ped faces; 5 percent coarse fragments; neutral.

The solum thickness ranges from 40 to 72 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 0 to 15 percent.

The A horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. The fine-earth texture is silt loam or silty clay loam.

The upper part of the B horizon has hue of 2.5YR or 5YR, and the lower part of the B horizon has hue of 2.5YR through 7.5YR. The B horizon has value of 4 or 5 and chroma of 4 through 8. The fine-earth texture is silty clay, clay, or silty clay loam.

### Hollinger Series

The soils of the Hollinger series are fine-loamy, mixed, mesic Typic Hapludalfs. They are deep and well drained and are on ridgetops and side slopes on uplands. They formed in materials weathered from micaceous limestone and calcareous schist and phyllite. Slopes range from 0 to 25 percent.

Hollinger soils are on the landscape with Conestoga, Pequea, and Clarksburg soils. The Hollinger soils have a thinner solum than the Conestoga soils, have more clay in the subsoil than the Pequea soils, and are better drained than the Clarksburg soils.

Typical pedon of Hollinger silt loam, 3 to 8 percent slopes, in a cultivated area in East Lampeter Township, 2 miles east of Bridgeport, 50 feet west of Buckwater Road and 1/4 mile south of the intersection of Buckwater Road and State Route 340:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; neutral; abrupt smooth boundary.

B21t—8 to 24 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common faint clay films on ped faces; slightly acid; clear wavy boundary.

B22t—24 to 30 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few faint clay films on ped faces; neutral; clear wavy boundary.

C1—30 to 36 inches; yellowish brown (10YR 5/6) loam; massive; friable, nonsticky, nonplastic; neutral; clear wavy boundary.



C2—36 to 60 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; friable, nonsticky, nonplastic; 10 percent coarse fragments; neutral.

The solum thickness ranges from 20 to 30 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 35 percent in the solum and from 0 to 50 percent in the substratum. Some pedons have flakes of mica, and their content generally increases with depth. Reaction is medium acid to neutral in the solum and slightly acid to mildly alkaline in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 through 8. The fine-earth texture is silt loam or loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 through 8. The fine-earth texture is loam, fine sandy loam, or sandy loam.

## Holly Series

The soils of the Holly series are fine-loamy, mixed, nonacid, mesic Typic Fluvaquents. They are deep and poorly drained and are on flood plains. They formed in alluvium from residuum weathered from noncalcareous sandstone and shale. Slopes range from 0 to 3 percent.

Holly soils are on the landscape with Bowmansville, Rowland, Comus, and Newark soils. The Holly soils are more poorly drained than the Rowland, Comus, or Newark soils and have a browner subsoil than the Bowmansville soils.

Typical pedon of Holly silt loam, in a pasture in West Cocalico Township, 3.2 miles north of Denver, 2,500 feet southeast of the intersection of Greenville Road and Hertzog Valley Road, at the west bank of Cocalico Creek:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; neutral; clear wavy boundary.

A2g—6 to 8 inches; dark gray (10YR 4/1) silt loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; neutral; clear smooth boundary.

B21g—8 to 12 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; neutral; clear wavy boundary.

B22g—12 to 25 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; neutral; clear wavy boundary.

B23g—25 to 27 inches; gray (N 6/0) loam; common medium distinct yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable, sticky, slightly plastic; neutral; clear wavy boundary.

C1g—27 to 34 inches; light gray (10YR 6/1) fine sandy loam; massive; friable, sticky, slightly plastic; neutral; clear wavy boundary.

C2g—34 to 42 inches; gray (N 6/0) sandy loam; massive; friable, slightly sticky, slightly plastic; neutral; clear wavy boundary.

IIC3—42 to 60 inches; gray (N 6/0) gravelly sand; single grain; loose, nonsticky, nonplastic; neutral.

The solum thickness ranges from 20 to 44 inches. The depth to contrasting material is 40 inches or more. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 10 percent above a depth of 40 inches and from 0 to 25 percent below 40 inches. Reaction ranges from medium acid through neutral throughout.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 1 or 2. The fine-earth texture is silt loam, loam, or silty clay loam.

The B horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2. The fine-earth texture is silt loam, loam, or silty clay loam.

The C horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2. The fine-earth texture is fine sandy loam, sandy loam, loam, or silt loam. Below a depth of 40 inches, the soil is stratified sand and gravel.

## Lansdale Series

The soils of the Lansdale series are coarse-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on uplands. They formed in residuum weathered from sandstone and conglomerate. Slopes range from 3 to 25 percent.

Lansdale soils are on the landscape with Bucks, Ungers, and Mount Lucas soils. The Lansdale soils have less clay and a yellower hue than the Bucks or Ungers soils. The Mount Lucas soils are moderately well drained and somewhat poorly drained.

Typical pedon of Lansdale loam, 3 to 8 percent slopes, in a cultivated area in Rapho Township, 1 mile northwest of Mastersonville and 800 feet southeast of the bridge on Colebrook Road that crosses Little Chickies Creek:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; 5 percent coarse fragments; neutral; clear smooth boundary.

B1—8 to 16 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure;

- friable; 5 percent coarse fragments; slightly acid; gradual wavy boundary.
- B21t—16 to 26 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on ped faces and sand grains; 5 percent coarse fragments; slightly acid; gradual wavy boundary.
- B22t—26 to 34 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on ped faces; 10 percent coarse fragments; slightly acid; gradual wavy boundary.
- C—34 to 46 inches; yellowish brown (10YR 5/6) gravelly sandy loam; massive; friable; 20 percent coarse fragments; slightly acid; gradual wavy boundary.
- R—46 inches; pale brown (10YR 6/3) sandstone.

The thickness of solum ranges from 20 to 40 inches and the depth to bedrock from 40 to 60 inches. The content of coarse fragments ranges from 5 to 25 percent in the solum. Reaction is very strongly acid to neutral throughout.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. The fine-earth texture is loam or sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. The fine-earth texture is sandy loam, loam, or sandy clay loam.

The C horizon has hue of 10YR or 7.5YR and value and chroma of 4 through 6.

## Lehigh Series

The soils of the Lehigh series are fine-loamy, mixed, mesic Aquic Hapludalfs. They are deep and moderately well drained and somewhat poorly drained and are on slightly concave slopes on uplands. They formed in residuum weathered from metamorphosed shale and sandstone. Slopes range from 3 to 15 percent.

Lehigh soils are on the landscape with well drained Ungers, Bucks, and Brecknock soils.

Typical pedon of Lehigh silt loam, 3 to 8 percent slopes, in a cultivated field in Mount Joy Township, 12.2 miles north of Milton Grove, 200 feet west of Trail Road and 0.7 mile north of the intersection of Trail Road and Harvest Road:

- Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; 10 percent coarse fragments; neutral; abrupt smooth boundary.
- B21t—7 to 16 inches; dark brown (7.5YR 4/2) channery silty clay loam; moderate fine subangular blocky structure; friable; 25 percent coarse fragments; neutral.

- B22t—16 to 32 inches; dark brown (7.5YR 3/2) channery silty clay loam; common medium faint dark yellowish brown (10YR 4/4) and gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm; common thick continuous clay and oxide coatings on ped faces; 30 percent coarse fragments; slightly acid; gradual wavy boundary.
- B23t—32 to 40 inches; very dark gray (10YR 3/1) channery silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; few thin continuous clay and black coatings on ped faces; 45 percent coarse fragments; medium acid; gradual wavy boundary.
- C—40 to 58 inches; dark gray (10YR 4/1) very channery silty clay loam; weak medium platy structure; firm; 50 percent coarse fragments; neutral.
- R—58 inches; very dark gray (10YR 3/1) porcelanite bedrock.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is 40 to 60 inches. The content of coarse fragments ranges from 0 to 45 percent in the Ap horizon, 5 to 60 percent in the B horizon, and 30 to 80 percent in the C horizon. Reaction is strongly acid to neutral throughout.

The Ap horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 1 through 3.

The B horizon has hue of 7.5YR through 5Y, value of 3 through 6, and chroma of 1 through 4. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 1 through 3. The fine-earth texture is silt loam or silty clay loam.

## Letort Series

The soils of the Letort series are fine-loamy, mixed, mesic Typic Hapludalfs. They are deep and well drained and are on ridgetops and side slopes on uplands. They formed in materials weathered from interbedded micaceous limestone and graphitic schist. Slopes range from 0 to 15 percent.

Letort soils are on the landscape with Pequea and Clarksburg soils. The Clarksburg soils are moderately well drained, and the Pequea soils do not have an argillic horizon.

Typical pedon of Letort silt loam, 3 to 8 percent slopes, in a cultivated field, 1 mile west of Willow Street and the intersection of Long Lane and State Route 272, 150 feet east and 200 feet north of the intersection of a farm lane and Long Lane:

- Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; 5 percent coarse fragments; neutral; abrupt smooth boundary.



B21t—9 to 19 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium subangular blocky structure; friable, nonsticky, nonplastic; few faint clay films on ped faces; neutral; clear wavy boundary.

B22t—19 to 32 inches; dark grayish brown (10YR 4/2) silt loam; weak coarse subangular blocky structure; friable, nonsticky, nonplastic; many distinct films on ped faces; 5 percent coarse fragments; neutral; clear wavy boundary.

C1—32 to 46 inches; very dark grayish brown (10YR 3/2) silt loam; massive; firm, nonsticky, nonplastic; 5 percent coarse fragments; neutral; gradual wavy boundary.

C2—46 to 62 inches; very dark grayish brown (10YR 3/2) and very dark gray (N 3/0) channery loam; massive; firm, nonsticky, nonplastic; 40 percent coarse fragments; neutral.

The solum thickness ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the solum and from 5 to 40 percent in the C horizon. Some pedons have flakes of mica, and their content generally increases with depth. Reaction ranges from strongly acid to neutral in the solum and from medium acid to mildly alkaline in the C horizon.

The A horizon has hue of 10YR and 2.5Y, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is loam or silt loam.

The B horizon has hue of 10YR through 5Y, value of 3 through 5, and chroma of 2 through 4. The fine-earth texture is loam, silt loam, silty clay loam, or clay loam.

The C horizon is neutral or has hue of 10YR through 5Y, value of 3 through 5, and chroma of 0 through 4. The fine-earth texture is sandy loam, loam, or silt loam.

## Linden Series

The soils of the Linden series are coarse-loamy, mixed, mesic Fluventic Dystrochrepts. They are deep and well drained and are on flood plains. They formed in alluvium from residuum weathered from red sandstone and siltstone. Slopes range from 0 to 3 percent.

Linden soils are on the landscape with Lindsides and Newark soils on flood plains. The Lindsides soils are moderately well drained, and the Newark soils are somewhat poorly drained.

Typical pedon of Linden silt loam, in a pasture in Manheim Township, 1.8 miles north of Hunsecker, 1/2 mile northeast of the intersection of Butter and Hunsecker Roads, 3/4 mile southwest of intersection of Butter Road and a farm lane, 100 feet west of Conestoga Creek:

Ap—0 to 10 inches; dark brown (7.5YR 3/2) silt loam, pinkish gray (7.5YR 6/2) dry; weak fine granular structure; friable, nonsticky, nonplastic; neutral; abrupt smooth boundary.

B21—10 to 18 inches; dark reddish brown (5YR 3/4) loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; neutral; clear smooth boundary.

B22—18 to 30 inches; reddish brown (5YR 4/3) loam; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; neutral; gradual smooth boundary.

B3—30 to 50 inches; reddish brown (5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; neutral; abrupt smooth boundary.

IIC—50 to 60 inches; dark reddish brown (5YR 3/4) very gravelly sandy loam; common medium faint pinkish gray (5YR 6/2) mottles; single grain; friable, nonsticky, nonplastic; 50 percent coarse fragments; neutral.

The solum thickness ranges from 24 to 50 inches. The depth to bedrock is 60 inches or more. The depth to the lithologic discontinuity is more than 40 inches. The content of coarse fragments ranges from 0 to 10 percent in the A and B2 horizons, from 0 to 25 percent in the parts of B3 and C horizons that are above a depth of 40 inches, and from 0 to 50 percent in the part of the C horizon below a depth of 40 inches. Reaction ranges from medium acid to neutral.

The Ap horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or fine sandy loam.

The B horizon has hue of 2.5YR or 5YR, value of 3 through 5, and chroma of 3 or 4. The fine-earth texture is silt loam, loam, or sandy loam.

The IIC horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 or 4. The fine-earth texture is sandy loam to sand.

## Lindsides Series

The soils of the Lindsides series are fine-silty, mixed, mesic Fluvaquentic Eutrochrepts. They are deep and moderately well drained and are on flood plains. They formed in alluvium from residuum weathered from limestone. Slopes range from 0 to 3 percent.

Lindsides soils are on the landscape with Nolin, Linden, and Newark soils. The Nolin and Linden soils are well drained, and the Newark soils are somewhat poorly drained.

Typical pedon of Lindsides silt loam, in a pasture in Manheim Township, 0.2 mile south of Hunsecker and 0.3 mile north on Mondale Road from its intersection with State Route 23, on east side of road:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; very friable, slightly sticky, nonplastic; few roots; neutral; clear wavy boundary.

- B21—10 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few roots; many distinct black coats on ped faces; neutral; gradual wavy boundary.
- B22—22 to 40 inches; light olive brown (2.5Y 5/4) silty clay loam; many fine and medium distinct yellowish red (5YR 4/6) and grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; many distinct black coats on ped faces; neutral; gradual wavy boundary.
- B3—40 to 50 inches; brown (10YR 5/3) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish red (5YR 4/6) mottles; moderate coarse subangular blocky structure; firm, slightly sticky, slightly plastic; neutral; clear wavy boundary.
- C—50 to 60 inches; dark brown (10YR 4/3) gravelly silty clay loam; common medium distinct yellowish brown (10YR 5/8) and light olive gray (5Y 6/2) mottles; massive; friable; 30 percent coarse fragments; neutral.

The solum thickness ranges from 25 to 50 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 5 percent in the solum and from 0 to 30 percent at a depth of more than 40 inches. Reaction ranges from strongly acid to neutral throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 or 3. The fine-earth texture is silt loam or silty clay loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 3 through 6. Low-chroma mottles are between depths of 14 and 24 inches. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 1 through 4. The fine-earth texture is silty clay loam, loam, or fine sandy loam and is weakly stratified.

## Manor Series

The soils of the Manor series are coarse-loamy, micaceous, mesic Typic Dystrochrepts. They are deep and well drained and are on hilltops and broad side slopes on the uplands. They formed in residuum from mica schist and quartzite. Slopes range from 3 to 60 percent.

Manor soils are on the landscape with Baile, Chester, Glenelg, and Glenville soils. The Manor soils do not have the argillic horizon typical of the Chester and Glenelg soils and are better drained than the Baile and Glenville soils.

Typical pedon of Manor silt loam, 8 to 15 percent slopes, in a cultivated field in New Britain Township, 2 miles northwest of Little Britain and 200 feet west of the intersection of Black Road and U.S. Route 222:

- Ap—0 to 10 inches; brown (7.5YR 4/4) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.
- B2—10 to 23 inches; yellowish red (5YR 5/8) channery silt loam; weak medium subangular blocky structure; friable, nonsticky, slightly plastic; many mica flakes; 15 percent coarse fragments; neutral; clear wavy boundary.
- C—23 to 60 inches; variegated reddish yellow (7.5YR 6/6) and light brown (7.5YR 6/4) channery loam; weak medium platy structure; friable, nonsticky, slightly plastic; many mica flakes; 25 percent coarse fragments; neutral.

The solum thickness ranges from 16 to 24 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 30 percent throughout. Reaction ranges from very strongly acid to neutral throughout.

The A horizon has hue of 5YR through 10YR, value of 3 through 6, and chroma of 1 through 6. The fine-earth texture is silt loam or loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 4 through 8. The fine-earth texture is loam or silt loam.

The C horizon has hue of 10R through 10YR, value of 4 through 8, and chroma of 2 through 8 and is variegated. The fine-earth texture is loam or sandy loam.

## Mount Lucas Series

The soils of the Mount Lucas series are fine-loamy, mixed, mesic Aquic Hapludalfs. They are deep and moderately well drained and somewhat poorly drained and are on slightly concave slopes on uplands. They formed in residuum weathered from diabase and other dark basic rocks. Slopes are 3 to 12 percent.

Mount Lucas soils are on the landscape with well drained Brecknock and Lansdale soils.

Typical pedon of Mount Lucas silt loam, in a wooded area of Mount Lucas very stony silt loam, 3 to 8 percent slopes, in Mount Joy Township, 3 miles west of Mastersonville, 100 feet southwest of Trail Road, and 1/4 mile north of the intersection of Trail Road and Elizabethtown Road:

- A1—0 to 2 inches; brown (7.5YR 4/2) silt loam; weak medium granular structure; friable, nonsticky, nonplastic; slightly acid; abrupt wavy boundary.
- A2—2 to 8 inches; brown (7.5YR 4/4) silt loam; weak medium granular structure; friable, slightly sticky, slightly plastic; slightly acid; clear wavy boundary.
- B21t—8 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; many fine distinct brown (7.5YR 5/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic;



common thin clay films on ped faces and in pores; 5 percent coarse fragments; slightly acid; gradual wavy boundary.

- B22t—16 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; many medium faint pinkish gray (7.5YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common thin clay films on ped faces and in pores; 10 percent coarse fragments; neutral; gradual wavy boundary.
- B3—26 to 30 inches; strong brown (7.5YR 5/6) gravelly clay loam; many medium faint pinkish gray (7.5YR 6/2) mottles; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; 25 percent coarse fragments; neutral; clear wavy boundary.
- C1—30 to 36 inches; strong brown (7.5YR 5/6) gravelly loam; many medium faint pinkish gray (7.5YR 6/2) mottles; massive; firm, slightly sticky, slightly plastic; 35 percent coarse fragments; neutral; clear wavy boundary.
- C2—36 to 60 inches; yellowish brown (10YR 5/6) gravelly silt loam; massive; firm, slightly sticky, nonplastic; 35 percent coarse fragments; neutral.

The solum thickness ranges from 25 to 50 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 30 percent in the solum and 20 to 60 percent in the C horizon. Reaction ranges from strongly acid to neutral throughout.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4. The fine-earth texture is silt loam or loam.

The B horizon has hue of 5YR through 10YR, value of 5 or 6, and chroma of 3 through 6. The fine-earth texture is silty clay loam, clay loam, or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. The fine-earth texture is loam or silt loam.

## Newark Series

The soils of the Newark series are fine-silty, mixed, nonacid, mesic Aeric Fluvaquents. They are deep and somewhat poorly drained and are on flood plains. They formed in alluvium from residuum from mica schist, mica gneiss, limestone, siltstone, and sandstone. Slopes range from 0 to 3 percent.

Newark soils are on the landscape with Lindsides, Linden, Holly, Comus, Elk, and Nolin soils. The Nolin, Comus, Linden, and Elk soils are well drained; the Lindsides soils are moderately well drained; and the Holly soils are poorly drained.

Typical pedon of Newark silt loam, in a pasture in East Hempfield Township, 0.2 mile north of Rohrerstown and 500 feet north of railroad track:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; mildly alkaline; abrupt smooth boundary.

A12—9 to 16 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; friable, slightly sticky, slightly plastic; mildly alkaline; clear wavy boundary.

B21—16 to 23 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine prominent grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; mildly alkaline; clear wavy boundary.

B22g—23 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; friable, slightly sticky, slightly plastic; mildly alkaline; clear wavy boundary.

Cg—32 to 60 inches; gray (N 6/0) gravelly silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles and few fine faint olive (5Y 5/3) mottles; massive; friable; 15 percent limestone fragments; neutral.

The solum thickness ranges from 22 to 44 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 5 percent to a depth of 30 inches, 0 to 15 percent between depths of 30 and 40 inches, and 0 to 60 percent at a depth of more than 40 inches. Reaction ranges from medium acid to mildly alkaline throughout.

The A horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or silty clay loam.

The B21 horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 3 through 5. The B22g horizon has hue of 7.5YR through 2.5Y, value of 4 through 5, and chroma of 1 or 2. The fine-earth texture is silt loam or silty clay loam.

The Cg horizon is neutral or has hue of 7.5YR through 2.5Y, value of 4 through 7, and chroma of 0 through 2, and it is mottled. The fine-earth texture is silt loam or silty clay loam.

## Nolin Series

The soils of the Nolin series are fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts. They are deep and well drained and are on flood plains. They formed in alluvium from residuum weathered from limestone and siltstone. Slopes range from 0 to 3 percent.

Nolin soils are on the landscape with Newark and Lindsides soils. The Newark soils are somewhat poorly drained, and the Lindsides soils are moderately well drained.

Typical pedon of Nolin silt loam, in a pasture in West Hempfield Township, 1 mile east of Newtown, 250 feet north of the intersection of Miller Avenue and Bridge Valley Road, along bank of Chickies Creek:

- Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; neutral; abrupt smooth boundary.
- B21—10 to 29 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; neutral; clear wavy boundary.
- B22—29 to 33 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; neutral; abrupt wavy boundary.
- B23—33 to 60 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; neutral.

The solum thickness is 40 inches or more. The depth to bedrock is 60 inches or more. The content of coarse fragments in the solum ranges from 0 to 5 percent. Reaction ranges from medium acid to moderately alkaline throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The fine-earth texture is silt loam, loam, or silty clay loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 3 or 4; the B22 horizon is mottled in some pedons. The fine-earth texture is silt loam or silty clay loam.

Some pedons have a C horizon that has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 2 through 4. The fine-earth texture is loam, silt loam, silty clay loam, fine sandy loam, or sandy loam. It is stratified in some pedons. The content of coarse fragments ranges from 0 to 30 percent.

## Penlaw Series

The soils of the Penlaw series are fine-silty, mixed, mesic Aquic Fragiudalfs. They are deep and somewhat poorly drained and are on concave upland slopes. They formed in residuum weathered from interbedded micaceous limestone, graphitic phyllite, and schist. Slopes range from 0 to 5 percent.

Penlaw soils are on the landscape with Hagerstown, Letort, Duffield, Conestoga and Clarksburg soils. The Hagerstown, Letort, Duffield and Conestoga soils are well drained; the Clarksburg soils are moderately well drained.

Typical pedon of Penlaw silt loam, in a cultivated field in West Lampeter Township, 1/2 mile southwest of Willow Street, 200 feet north of Penn Grant Road, and 1/4 mile east of the intersection of Penn Grant Road and U.S. Route 222:

- Ap—0 to 12 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; neutral; abrupt smooth boundary.
- B21t—12 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, sticky, plastic; continuous moderately thick clay films on ped faces and in pores; neutral; clear wavy boundary.
- B22t—18 to 29 inches; strong brown (7.5YR 5/6) silty clay loam; many coarse faint brown (7.5YR 5/2) mottles; moderate coarse subangular blocky structure; firm, sticky, plastic; continuous moderately thick clay films on ped faces and in pores; neutral; gradual wavy boundary.
- Bx1—29 to 40 inches; strong brown (7.5YR 5/6) silt loam; many coarse faint brown (7.5YR 5/2) mottles; weak very coarse prismatic structure; very firm and brittle, slightly sticky, slightly plastic; few thin clay films in pores; neutral; clear wavy boundary.
- Bx2—40 to 55 inches; strong brown (7.5YR 5/6) silt loam; many coarse faint brown (7.5YR 5/2) mottles and few coarse distinct gray (10YR 6/1) mottles; weak very coarse prismatic structure; very firm and brittle, slightly sticky, slightly plastic; neutral; clear wavy boundary.
- C—55 to 60 inches; dark grayish brown (10YR 4/2) loam; many fine distinct strong brown (7.5YR 5/6) mottles; massive; friable, nonsticky, nonplastic; neutral.

The solum thickness ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The depth to the fragipan is 15 to 30 inches. The content of coarse fragments ranges from 0 to 10 percent above the fragipan and from 0 to 30 percent in the fragipan and the C horizon. Reaction ranges from medium acid to neutral throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 through 8. The fine-earth texture is silt loam or silty clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 8. The fine-earth texture is silt loam or silty clay loam.

The C horizon has hue of 10YR through 5YR, value of 2 through 6, and chroma of 2 through 8. The fine-earth texture ranges from loam to clay.

## Pequea Series

The soils of the Pequea series are coarse-loamy, mixed, mesic Typic Eutrochrepts. They are deep and well drained and are on convex slopes on uplands. They formed in residuum of micaceous limestone and



calcareous and graphitic schist. Slopes range from 8 to 50 percent.

Pequea soils are on the landscape with Letort, Conestoga, and Hollinger soils. The Pequea soils do not have the argillic horizon typical of those soils.

Typical pedon of Pequea silt loam, 8 to 15 percent slopes, in a cultivated field in Manor Township, 1.6 miles southwest of Millersville, 300 feet south of Owl Bridge Road, and 1/4 mile west of the intersection of Owl Bridge Road and Sun Lane:

- Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable, slightly sticky, slightly plastic; 5 percent coarse fragments; slightly acid; clear wavy boundary.
- B—10 to 26 inches; very dark grayish brown (2.5Y 3/2) channery loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common mica flakes; 20 percent coarse fragments; neutral; gradual wavy boundary.
- C—26 to 52 inches; dark olive gray (5Y 3/2) and olive gray (5Y 4/2) channery loam; weak thin platy structure; friable; many mica flakes; 25 percent coarse fragments; slightly effervescent; mildly alkaline; gradual wavy boundary.
- R—52 inches; dark gray (10YR 4/1) and black (10YR 2/1) interbedded micaceous limestone and graphitic phyllite bedrock.

The solum thickness ranges from 16 to 35 inches. The depth to bedrock ranges from 40 to 60 inches. The content of coarse fragments ranges from 2 to 30 percent in the solum and from 10 to 40 percent in the C horizon. Reaction is slightly acid or neutral in the solum. It is mildly alkaline or moderately alkaline in the substratum.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam, loam, or sandy loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 2 through 4, and chroma of 1 through 4. The fine-earth texture is loam, silt loam, or sandy loam.

The C horizon has hue of 10YR through 5Y, value of 3 or 4, and chroma of 1 or 2. The fine-earth texture is loam or sandy loam.

## Readington Series

The soils of the Readington series are fine-loamy, mixed, mesic Typic Fragiudalfs. They are deep and moderately well drained and are on uplands. They formed in residuum weathered from red siltstone and sandstone. Slopes range from 3 to 10 percent.

Readington soils are on the landscape with Bucks, Ungers, and Abbottstown soils. The Bucks and Ungers soils are well drained, and the Abbottstown soils are somewhat poorly drained.

Typical pedon of Readington silt loam, 3 to 10 percent slopes, in a cultivated field 2 miles north of Denver, 50 feet west of Pennebecker Road, and 100 feet north of the intersection of Pennebecker Road and Greenville Road:

- Ap—0 to 9 inches; dark reddish brown (5YR 3/4) silt loam, light reddish brown (5YR 6/4) dry; moderate fine granular structure; friable, slightly sticky, plastic; slightly acid; abrupt smooth boundary.
- B21t—9 to 25 inches; reddish brown (2.5YR 4/4) clay loam; moderate coarse subangular blocky structure; friable, sticky, plastic; continuous thin clay films in pores; 5 percent coarse fragments; slightly acid; clear wavy boundary.
- B22t—25 to 33 inches; dark red (2.5YR 3/6) clay loam; common medium distinct yellowish red (5YR 4/6), gray (5YR 6/1), and reddish brown (5YR 5/4) mottles and streaks; moderate coarse subangular blocky structure; firm, sticky, plastic; thick clay films in pores; 5 percent coarse fragments; strongly acid; clear wavy boundary.
- Bx1—33 to 48 inches; dusky red (2.5YR 3/2) clay loam; common medium distinct yellowish red (5YR 4/6), gray (5YR 6/1), and reddish brown (5YR 5/4) mottles; weak very coarse prismatic structure parting to moderate coarse subangular blocky; very firm, brittle, sticky, slightly plastic; thick clay films in pores; 10 percent coarse fragments; strongly acid; clear wavy boundary.
- Bx2—48 to 58 inches; dark red (10YR 3/6) channery clay loam; very coarse prismatic structure parting to weak coarse subangular blocky; very firm, brittle, slightly sticky, slightly plastic; black coatings on ped; 25 percent coarse fragments; medium acid.
- R—58 inches; dark red (10R 3/6) sandstone bedrock.

The solum thickness ranges from 35 to 60 inches. The depth to bedrock ranges from 40 to 60 inches. The depth to the fragipan ranges from 20 to 36 inches. The content of coarse fragments ranges from 0 to 20 percent in the upper part of the solum and from 10 to 50 percent in the lower part. Reaction ranges from very strongly acid to slightly acid throughout.

The Ap horizon has hue of 2.5YR through 10YR, value of 3 or 4, and chroma of 2 through 4. The fine-earth texture is silt loam or loam.

The B2 horizon has hue of 2.5YR or 5YR, value of 3 through 5, and chroma of 3 through 6. The fine-earth texture is silt loam, clay loam, or silty clay loam.

The Bx horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 2 through 6. The fine-earth texture is silt loam, clay loam, or silty clay loam.

## Rowland Series

The soils of the Rowland series are fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts. They are deep and moderately well drained and somewhat poorly drained and are on flood plains. They formed in alluvium and residuum weathered from reddish sandstone and siltstone. Slopes range from 0 to 3 percent.

Rowland soils are on the landscape with Bowmansville and Holly soils. The Rowland soils are better drained and have a higher chroma in the B horizon than the Bowmansville and Holly soils.

Typical pedon of Rowland silt loam, in a pasture in West Cocalico Township, 2.2 miles north of Denver, 50 feet east of Swamp Bridge Road, along a small creek:

- Ap—0 to 9 inches; dark reddish brown (5YR 3/4) silt loam, light reddish brown (5YR 6/4) dry; weak fine granular structure; medium acid; abrupt smooth boundary.
- B1—9 to 20 inches; reddish brown (5YR 4/4) silt loam; weak coarse subangular blocky structure; friable, nonsticky, nonplastic; medium acid; abrupt wavy boundary.
- B2—20 to 25 inches; reddish brown (5YR 4/4) silt loam, common fine distinct strong brown (7.5YR 5/8) and brown (7.5YR 5/2) mottles; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; medium acid; clear wavy boundary.
- C1g—25 to 42 inches; pinkish gray (7.5YR 6/2) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; massive; firm, slightly sticky, nonplastic; medium acid; clear wavy boundary.
- IIC2g—42 to 60 inches; dark gray (5YR 4/1) and weak red (10R 4/4) very gravelly sand; single grain; nonsticky, nonplastic; 75 percent gravel; medium acid.

The solum ranges from 24 to 40 inches in thickness. The depth to bedrock is more than 5 feet. The depth to stratified sand and gravel is more than 40 inches. Waterworn pebbles make up 0 to 10 percent of the solum, 0 to 25 percent of the C horizon, and 30 to 90 percent of the IIC horizon. Reaction throughout the soil ranges from strongly acid to neutral.

The Ap horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 through 6. The fine-earth texture is silt loam or sandy loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 3 through 6, and chroma of 3 through 8. The fine-earth texture is silt loam, loam, silty clay loam, clay loam, or sandy clay loam.

The C horizon, above the stratified sand and gravel, has hue of 2.5YR through 7.5YR, value of 3 through 6, and chroma of 2 through 8. The fine-earth texture is sandy loam, sandy clay loam, clay loam, loam, silt loam, or silty clay loam. The IIC horizon mainly is stratified sand and gravel but has lenses of silt and clay.

## Udifluvents

Udifluvents have characteristics that are too variable for classification at the series level. The soils are moderately deep and deep and are moderately well drained and well drained. They are on flood plains. They are a heterogeneous mixture of recently deposited alluvium or alluvium that has been altered by man. Slopes range from 0 to 3 percent.

Udifluvents are on the landscape with Fluvaquents and Holly, Newark, and Linden soils. Udifluvents are better drained than the Fluvaquents or Holly or Newark soils and do not have the distinct B horizon typical of the Linden soils.

Because of the variability of Udifluvents, a typical pedon is not described.

The depth to bedrock is more than 20 inches. The content of coarse fragments ranges from 5 to 80 percent in individual subhorizons. The soils are strongly acid to neutral throughout.

The A horizon is 4 to 15 inches thick. It has hue of 7.5YR through 2.5Y, value of 4 through 7, and chroma of 1 through 3. The fine-earth texture ranges from sandy loam to silt loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 through 6, and chroma of 1 through 6. It is mottled in the lower part of some pedons. The fine-earth texture ranges mainly from sandy loam to silty clay loam. Some pedons have layers of sand or loamy sand.

## Udorthents

Udorthents have characteristics that are too variable for classification at the series level. The soils are shallow to deep and are well drained. They are on uplands. They formed as a result of altering the landscape for landfills, industry, developments, and other uses. Slopes range from 0 to 30 percent.

Udorthents are on the landscape with Hagerstown, Duffield, Chester, Manor, and Ungers soils. Udorthents are not so developed as those soils and have a more variable profile.

Udorthents in this survey area are made up of many different kinds of pedons, none of which is considered typical. A pedon used as a reference for Udorthents is in an area of Udorthents, loamy, 1/2 mile east of Holtwood on Pinnacle Road and 500 feet south of Pinnacle Road, at a soil-covered fly-ash pond:

- Ap—0 to 8 inches; brown (10YR 5/3) gravelly loam; weak fine granular structure; friable, nonsticky, nonplastic; 30 percent coarse fragments; slightly acid; abrupt wavy boundary.
- C—8 to 60 inches; yellowish brown (10YR 5/4) very gravelly loam; massive; firm, nonsticky, nonplastic; 50 percent coarse fragments; medium acid.



The depth of the soil material is more than 48 inches over bedrock or original soil material. The content of coarse fragments ranges from about 0 to 60 percent throughout. Reaction is strongly acid to neutral throughout. The A and C horizons are neutral or have hue of 10R through 2.5Y, value of 2 through 8, and chroma of 0 through 8. The fine-earth texture ranges from sandy loam to silty clay loam.

## Ungers Series

The soils of the Ungers series are fine-loamy, mixed, mesic Typic Hapludults. They are deep and well drained and are on ridgetops and side slopes on uplands. They formed in residuum weathered from red siltstone and sandstone. Slopes range from 3 to 50 percent.

Ungers soils are on the landscape with Bucks, Brecknock, Readington, Lansdale, and Abbottstown soils. The Ungers soils have more sand in the fine-earth fraction than the Bucks or Brecknock soils and have a redder subsoil than the Lansdale soils. The Readington soils are moderately well drained, and the Abbottstown soils are somewhat poorly drained.

Typical pedon of Ungers loam, 3 to 8 percent slopes, in a cultivated field in West Cocalico Township, 1 mile west of Blainsport, 1/4 mile south of the intersection of a private access road and State Route 897:

- Ap—0 to 10 inches; dark reddish brown (5YR 3/3) loam, light reddish brown (5YR 6/3) dry; granular structure; friable, slightly sticky, nonplastic; many fine and medium roots; 10 percent coarse fragments; neutral; abrupt wavy boundary.
- B21t—10 to 20 inches; dark reddish brown (2.5YR 3/4) sandy clay loam; moderate medium and fine subangular blocky structure; friable, slightly sticky,

slightly plastic; many fine and medium roots; thin clay films in pores, on ped faces, and bridging sand grains; 10 percent coarse fragments; strongly acid; abrupt wavy boundary.

- B22t—20 to 36 inches; dark reddish brown (2.5YR 3/4) loam; moderate fine subangular blocky structure; friable, nonsticky, nonplastic; common fine and medium roots; thin clay films in pores, on ped faces, and bridging sand grains; 10 percent coarse fragments; strongly acid; clear wavy boundary.
- B3—36 to 46 inches; dusky red (10YR 3/3) gravelly loam; moderate fine subangular blocky structure; friable, nonsticky, nonplastic; few fine roots; 15 percent coarse fragments; strongly acid; gradual wavy boundary.
- C—46 to 50 inches; dusky red (10R 3/3) gravelly sandy loam; massive; friable, nonsticky, nonplastic; few fine roots; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.
- R—50 inches; dusky red (10R 3/3) sandstone bedrock.

The solum thickness ranges from 30 to 55 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 5 to 30 percent in the Ap horizon, from 5 to 60 percent in the B horizon, and from 40 to 90 percent in the C horizon. Reaction is extremely acid to neutral throughout.

The Ap horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. The fine-earth texture is loam or silt loam.

The B horizon has hue of 10R through 5YR, value of 3 through 5, and chroma of 3 or 4. The fine-earth texture is loam, clay loam, or sandy clay loam.

The C horizon has hue of 10R through 5YR, value of 3 through 5, and chroma of 3 or 4. The fine-earth texture is loam or sandy loam.

# Formation of the Soils

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This section describes the factors of soil formation and relates them to the formation of soils in the survey area.

## Factors of Soil Formation

Soils are a mixture of weathered rocks, minerals, organic matter, water, and air. Soils formed through the chemical and physical weathering of geologic materials. The extent of the weathering and the characteristics of any soil depend on the nature of the parent rock, the kind of climate, the relief, or lay of the land, the plant and animal life in and on the soil, and the length of time these factors have affected development.

In a small area, such as Lancaster County, where plant and animal life and climate and time vary only slightly, the nature of the parent rock and the relief are responsible for most of the differences in soil properties. The nature of the parent rock determines the texture and mineral content of the soils. Relief affects drainage, aeration, runoff, erosion, and exposure to sun and wind. Plant and animal life influences soil characteristics by physical and chemical removals and additions. Climate influences the nature and extent of the weathering processes. Time is required for the processes responsible for soil development. Long periods generally are needed for soil development.

### Parent Material

Parent material is the unconsolidated mass from which the soils are formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which soil-forming processes take place.

The soils of Lancaster County formed in parent material weathered from shale, siltstone, sandstone, conglomerate, limestone, quartzite, schist, gneiss, and diabase and other crystalline rocks.

Most soils in the county formed in place in residuum directly over the original bedrock. Some examples are: Hagerstown and Duffield soils formed in materials weathered from limestone; Conestoga, Hollinger, and Letort soils formed in materials from micaceous limestone; Lansdale and Clymer soils formed in materials from quartzite, sandstone, and conglomerate; Bucks, Ungers, and Brecknock soils formed in materials from siltstone and sandstone; Chester, Glenelg, and Manor soils formed in materials from mica schist; and Mount

Lucas soils formed in materials from diabase. Some soils formed in alluvium or stream-deposited materials. These deposits are old or of recent origin. Elk soils formed on terraces in old deposits. Comus, Nolin, and Linden soils formed in recent deposits.

### Relief

The relief in Lancaster County consists mainly of nearly level to moderately steep, dissected uplands. The relief is influenced by differential weathering and original deformations of bedrock.

The highest ridges in the county, where, for example, Clymer and Ungers soils formed, are sandstone that is highly resistant to erosion. On the nearly level to moderately steep valley floors, Conestoga, Duffield, Hagerstown, and Letort soils formed in easily weathered limestone.

Intermediate in resistance to weathering between sandstone and limestone are shale, siltstone, and schist. Upland divides and rolling slopes are typical of the shale and siltstone areas of the county, on which soils such as Bucks, Ungers, and Brecknock soils formed. Chester, Glenelg, and Manor soils are over mica schist on broad ridgetops and side slopes of well dissected uplands. New and old water-deposited material adjacent to or near streams makes up the nearly level flood plains on which the Comus, Nolin, and Linden soils formed and the terraces on which Elk soils formed.

### Plant and Animal Life

Vegetation, animals, bacteria, and fungi affect soil formation. The vegetation is generally responsible for the amount of organic matter, the color of the surface layer, and the amount of nutrients. Animals such as earthworms, cicadas, and other burrowing animals help keep the soil open and porous. Bacteria and fungi decompose the vegetation, thus releasing nutrients for plant food. The native forests in Lancaster County have had more influence on soil formation than have any other living organism. Man, however, has greatly influenced the surface layer by clearing the forests and plowing the land. He has added fertilizers, mixed some of the soil horizons, and has moved some soil materials from place to place.



## Climate

The climate of Lancaster County is characteristic of the humid-continental type of the Middle Atlantic States. Some characteristics of the soil profiles indicate this kind of climate prevailed when the soils were forming and that it influenced soil development. For example, some of the soils are acid and strongly leached. The effect of climate on the formation of soils has been nearly uniform throughout the county, but microclimate caused by differences in relief may have influenced the development of some soils.

## Time

The length of time the soil formation factors have acted on the weathered mineral material is indicated to some extent by the degree of development in the soil profile. Some soils, especially those formed in alluvium, show very little profile development because the soil material has not been in place long enough for distinct

horizons to form. Other soils vary in the degree in which horizon formation has progressed. Holly, Newark, and Bowmansville soils, for example, formed in alluvium. These soils have little profile development. Profile development is impeded because new material is being deposited constantly on the surface with each inundation by floodwater. These soils are often called young soils, or soils of recent origin.

The profile development of the Pequea and Manor soils has advanced sufficiently so that some changes have taken place in the parent material. These changes, however, do not represent the effects of advanced weathering. Weathering and development of the profile of these soils have been slowed by the effects of relief and by the kind of parent material.

The Hagerstown, Duffield, and Hollinger soils have a well developed profile. The parent material of these soils has been in place for a period long enough that distinct horizons have had time to develop.

## References

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- (1) American Association of State Highway and Transportation Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.
- (2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.
- (3) Pennsylvania Department of Agriculture, Crop Reporting Service. 1980. Pennsylvania crop and livestock annual summary, 1980. CRS-78. 88 pp.
- (4) Pennsylvania State University Agricultural Experiment Station. 1972. Laboratory characterization data and field descriptions of selected Pennsylvania soils.
- (5) Pennsylvania State University Agricultural Experiment Station. 1974. Characteristics, interpretations, and uses of Pennsylvania soils developed from cherty limestone materials. Penn St. Ag. Exp. Sta. Prog. Rept. 341.
- (6) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]
- (7) United States Department of Agriculture. 1968. The timber resources of Pennsylvania. Forest Serv. Resour. Bull. E-8.
- (8) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.
- (9) United States Department of Commerce, Bureau of the Census. 1981. Final population and housing unit counts. PHC 80-V-40.





# Glossary

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Area reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

|               | <i>Inches</i>    |
|---------------|------------------|
| Very low..... | 0 to 2.4         |
| Low.....      | 2.4 to 3.2       |
| Moderate..... | 3.2 to 5.2       |
| High.....     | greater than 5.2 |

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

**Channery soil.** A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay,

less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Coarse fragments.** If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

**Coarse textured soil.** Sand or loamy sand.

**Colluvium.** Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

**Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

**Conservation tillage.** A form of tillage that retains protective amounts of residue mulch on the surface throughout the year by use of no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

**Consistence, soil.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—  
*Loose.*—Noncoherent when dry or moist; does not hold together in a mass.

*Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

*Firm.*—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Plastic.*—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.



*Sticky*.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

*Hard*.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

*Soft*.—When dry, breaks into powder or individual grains under very slight pressure.

*Cemented*.—Hard; little affected by moistening.

**Contour stripcropping**. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section**. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Corrosive**. High risk of corrosion to uncoated steel or deterioration of concrete.

**Cover crop**. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Deferred grazing**. Postponing grazing or resting grazingland for a prescribed period.

**Dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

**Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

**Diversion (or diversion terrace)**. A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained*.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained*.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained*.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained*.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

*Somewhat poorly drained*.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained*.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

*Very poorly drained*.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

**Drainage, surface**. Runoff, or surface flow of water, from an area.

**Eluviation**. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Erosion**. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion. *Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Excess fines** (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

**Excess sulfur** (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fine textured soil.** Sandy clay, silty clay, and clay.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Ground water** (geology). Water filling all the unblocked pores of underlying material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil

horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

*R layer.*—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of



the acreage is artificially drained and part is undrained.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are—  
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.  
*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Large stones** (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Sandy loam and fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, and silty clay loam.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Munsell notation.** A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The downward movement of water through the soil.

**Perco slowly** (in tables). The slow movement of water through the soil adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow..... less than 0.06 inch

|                       |                        |
|-----------------------|------------------------|
| Slow.....             | 0.06 to 0.2 inch       |
| Moderately slow.....  | 0.2 to 0.6 inch        |
| Moderate.....         | 0.6 inch to 2.0 inches |
| Moderately rapid..... | 2.0 to 6.0 inches      |
| Rapid.....            | 6.0 to 20 inches       |
| Very rapid.....       | more than 20 inches    |

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor outlets** (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

|                             | pH             |
|-----------------------------|----------------|
| Extremely acid.....         | below 4.5      |
| Very strongly acid.....     | 4.5 to 5.0     |
| Strongly acid.....          | 5.1 to 5.5     |
| Medium acid.....            | 5.6 to 6.0     |
| Slightly acid.....          | 6.1 to 6.5     |
| Neutral.....                | 6.6 to 7.3     |
| Mildly alkaline.....        | 7.4 to 7.8     |
| Moderately alkaline.....    | 7.9 to 8.4     |
| Strongly alkaline.....      | 8.5 to 9.0     |
| Very strongly alkaline..... | 9.1 and higher |

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

**Rippable.** Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-size particles.

**Saprolite** (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shrink-swell.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in



a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slope** (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones** (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

|                       | Millime-<br>ters |
|-----------------------|------------------|
| Very coarse sand..... | 2.0 to 1.0       |
| Coarse sand.....      | 1.0 to 0.5       |
| Medium sand.....      | 0.5 to 0.25      |
| Fine sand.....        | 0.25 to 0.10     |
| Very fine sand.....   | 0.10 to 0.05     |
| Silt.....             | 0.05 to 0.002    |
| Clay.....             | less than 0.002  |

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive*

(the particles adhering without any regular cleavage, as in many hardpans).

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Thin layer** (in tables). Otherwise suitable soil material too thin for the specified use.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Unstable fill** (in tables). Risk of caving or sloughing on banks of fill material.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

## Tables

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TABLE 1.--TEMPERATURE AND PRECIPITATION  
[Recorded in the period 1951-78 at Ephrata, Pennsylvania]

| Month       | Temperature                 |                             |           |                                            |                                           |                                                                | Precipitation |                              |                |                                                           |                     |
|-------------|-----------------------------|-----------------------------|-----------|--------------------------------------------|-------------------------------------------|----------------------------------------------------------------|---------------|------------------------------|----------------|-----------------------------------------------------------|---------------------|
|             | Average<br>daily<br>maximum | Average<br>daily<br>minimum | Average   | 2 years in<br>10 will have--               |                                           | Average<br>number of<br>growing<br>degree<br>days <sup>1</sup> | Average       | 2 years in 10<br>will have-- |                | Average<br>number of<br>days with<br>0.10 inch<br>or more | Average<br>snowfall |
|             |                             |                             |           | Maximum<br>temperature<br>higher<br>than-- | Minimum<br>temperature<br>lower<br>than-- |                                                                |               | Less<br>than--               | More<br>than-- |                                                           |                     |
|             | <u>°F</u>                   | <u>°F</u>                   | <u>°F</u> | <u>°F</u>                                  | <u>°F</u>                                 | <u>Units</u>                                                   | <u>In</u>     | <u>In</u>                    | <u>In</u>      |                                                           | <u>In</u>           |
| January---- | 37.1                        | 21.3                        | 29.2      | 63                                         | -2                                        | 27                                                             | 2.97          | 1.55                         | 4.20           | 7                                                         | 8.4                 |
| February--- | 40.3                        | 23.0                        | 31.7      | 65                                         | -1                                        | 29                                                             | 2.50          | 1.43                         | 3.44           | 6                                                         | 8.3                 |
| March-----  | 49.7                        | 30.5                        | 40.1      | 75                                         | 13                                        | 107                                                            | 3.57          | 2.41                         | 4.62           | 8                                                         | 4.9                 |
| April-----  | 62.7                        | 40.5                        | 51.6      | 87                                         | 24                                        | 348                                                            | 3.82          | 2.19                         | 5.27           | 8                                                         | .1                  |
| May-----    | 72.7                        | 49.8                        | 61.3      | 91                                         | 34                                        | 660                                                            | 3.41          | 1.71                         | 4.88           | 8                                                         | .0                  |
| June-----   | 81.1                        | 58.9                        | 70.0      | 95                                         | 45                                        | 900                                                            | 4.15          | 2.03                         | 5.97           | 8                                                         | .0                  |
| July-----   | 85.0                        | 63.2                        | 74.1      | 96                                         | 51                                        | 1,057                                                          | 4.17          | 1.70                         | 6.24           | 6                                                         | .0                  |
| August----- | 83.1                        | 62.0                        | 72.6      | 94                                         | 47                                        | 1,011                                                          | 4.59          | 2.16                         | 6.67           | 8                                                         | .0                  |
| September-- | 76.1                        | 55.3                        | 65.7      | 92                                         | 37                                        | 771                                                            | 3.95          | 1.84                         | 5.75           | 6                                                         | .0                  |
| October---- | 65.3                        | 44.7                        | 55.0      | 83                                         | 26                                        | 465                                                            | 3.03          | 1.30                         | 4.49           | 5                                                         | .0                  |
| November--- | 52.1                        | 34.9                        | 43.5      | 73                                         | 16                                        | 142                                                            | 3.43          | 1.93                         | 4.75           | 7                                                         | .9                  |
| December--- | 40.6                        | 25.7                        | 33.2      | 64                                         | 5                                         | 41                                                             | 3.57          | 1.62                         | 5.22           | 7                                                         | 4.3                 |
| Yearly:     |                             |                             |           |                                            |                                           |                                                                |               |                              |                |                                                           |                     |
| Average--   | 62.2                        | 42.5                        | 52.3      | ---                                        | ---                                       | ---                                                            | ---           | ---                          | ---            | ---                                                       | ---                 |
| Extreme--   | ---                         | ---                         | ---       | 99                                         | -4                                        | ---                                                            | ---           | ---                          | ---            | ---                                                       | ---                 |
| Total----   | ---                         | ---                         | ---       | ---                                        | ---                                       | 5,558                                                          | 43.16         | 36.30                        | 49.67          | 84                                                        | 26.9                |

<sup>1</sup>A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-78  
at Ephrata, Pennsylvania]

| Probability                                | Temperature       |                   |                    |
|--------------------------------------------|-------------------|-------------------|--------------------|
|                                            | 24° F<br>or lower | 28° F<br>or lower | 32° F.<br>or lower |
| Last freezing<br>temperature<br>in spring: |                   |                   |                    |
| 1 year in 10<br>later than--               | April 11          | April 17          | May 2              |
| 2 years in 10<br>later than--              | April 5           | April 15          | April 27           |
| 5 years in 10<br>later than--              | March 26          | April 6           | April 17           |
| First freezing<br>temperature<br>in fall:  |                   |                   |                    |
| 1 year in 10<br>earlier than--             | October 31        | October 23        | October 5          |
| 2 years in 10<br>earlier than--            | November 5        | October 27        | October 11         |
| 5 years in 10<br>earlier than--            | November 15       | November 4        | October 21         |

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-78  
at Ephrata, Pennsylvania]

| Probability   | Length of growing season if<br>daily minimum temperature is-- |                         |                         |
|---------------|---------------------------------------------------------------|-------------------------|-------------------------|
|               | Higher<br>than<br>24° F                                       | Higher<br>than<br>28° F | Higher<br>than<br>32° F |
|               | <u>Days</u>                                                   | <u>Days</u>             | <u>Days</u>             |
| 9 years in 10 | 213                                                           | 196                     | 163                     |
| 8 years in 10 | 220                                                           | 201                     | 171                     |
| 5 years in 10 | 233                                                           | 211                     | 186                     |
| 2 years in 10 | 247                                                           | 220                     | 202                     |
| 1 year in 10  | 254                                                           | 225                     | 210                     |



TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

| Map symbol | Soil name                                                         | Acres  | Percent |
|------------|-------------------------------------------------------------------|--------|---------|
| AbB        | Abbottstown silt loam, 3 to 8 percent slopes-----                 | 2,044  | 0.3     |
| AsB        | Abbottstown extremely stony silt loam, 3 to 8 percent slopes----- | 332    | 0.1     |
| Ba         | Baile silt loam-----                                              | 1,395  | 0.2     |
| BdA        | Bedington silt loam, 0 to 3 percent slopes-----                   | 1,974  | 0.3     |
| BdB        | Bedington silt loam, 3 to 8 percent slopes-----                   | 17,832 | 2.9     |
| BdC        | Bedington silt loam, 8 to 15 percent slopes-----                  | 12,913 | 2.1     |
| BeD        | Bedington channery silt loam, 15 to 25 percent slopes-----        | 9,737  | 1.6     |
| Bm         | Blairton silt loam, 3 to 10 percent slopes-----                   | 1,601  | 0.3     |
| Bo         | Bowmansville silt loam-----                                       | 3,968  | 0.6     |
| BrB        | Brecknock gravelly silt loam, 3 to 8 percent slopes-----          | 1,993  | 0.3     |
| BrC        | Brecknock gravelly silt loam, 8 to 15 percent slopes-----         | 1,001  | 0.2     |
| BsB        | Brecknock very stony silt loam, 3 to 8 percent slopes-----        | 943    | 0.2     |
| BsC        | Brecknock very stony silt loam, 8 to 25 percent slopes-----       | 1,324  | 0.2     |
| BuA        | Bucks silt loam, 0 to 3 percent slopes-----                       | 334    | 0.1     |
| BuB        | Bucks silt loam, 3 to 8 percent slopes-----                       | 14,743 | 2.4     |
| BuC        | Bucks silt loam, 8 to 15 percent slopes-----                      | 5,646  | 0.9     |
| BuD        | Bucks silt loam, 15 to 25 percent slopes-----                     | 951    | 0.2     |
| BxC        | Bucks very stony silt loam, 8 to 25 percent slopes-----           | 395    | 0.1     |
| CbA        | Chester silt loam, 0 to 3 percent slopes-----                     | 4,530  | 0.7     |
| CbB        | Chester silt loam, 3 to 8 percent slopes-----                     | 42,935 | 6.9     |
| CbC        | Chester silt loam, 8 to 15 percent slopes-----                    | 11,741 | 1.9     |
| CkA        | Clarksburg silt loam, 0 to 5 percent slopes-----                  | 12,671 | 2.0     |
| ClB        | Clymer very stony loam, 3 to 8 percent slopes-----                | 1,833  | 0.3     |
| ClD        | Clymer very stony loam, 8 to 25 percent slopes-----               | 5,070  | 0.8     |
| ClF        | Clymer very stony loam, 25 to 50 percent slopes-----              | 995    | 0.2     |
| Cm         | Comus silt loam-----                                              | 1,985  | 0.3     |
| CnA        | Conestoga silt loam, 0 to 3 percent slopes-----                   | 2,046  | 0.3     |
| CnB        | Conestoga silt loam, 3 to 8 percent slopes-----                   | 10,315 | 1.7     |
| CnC        | Conestoga silt loam, 8 to 15 percent slopes-----                  | 531    | 0.1     |
| DbA        | Duffield silt loam, 0 to 3 percent slopes-----                    | 22,866 | 3.7     |
| DdB        | Duffield silt loam, 3 to 8 percent slopes-----                    | 51,210 | 8.1     |
| EcA        | Elk silt loam, 0 to 3 percent slopes-----                         | 1,224  | 0.2     |
| EcB        | Elk silt loam, 3 to 8 percent slopes-----                         | 1,894  | 0.3     |
| EcC        | Elk silt loam, 8 to 15 percent slopes-----                        | 708    | 0.1     |
| Eu         | Elk-Urban land complex-----                                       | 518    | 0.1     |
| Ff         | Fluvaquents and Udifluvents, loamy-----                           | 1,442  | 0.2     |
| GbB        | Glenelg silt loam, 3 to 8 percent slopes-----                     | 17,051 | 2.7     |
| GbC        | Glenelg silt loam, 8 to 15 percent slopes-----                    | 22,358 | 3.6     |
| GbD        | Glenelg silt loam, 15 to 25 percent slopes-----                   | 6,387  | 1.0     |
| GdB        | Glenville silt loam, 3 to 8 percent slopes-----                   | 17,653 | 2.8     |
| HaA        | Hagerstown silt loam, 0 to 3 percent slopes-----                  | 15,742 | 2.5     |
| HaB        | Hagerstown silt loam, 3 to 8 percent slopes-----                  | 42,832 | 6.8     |
| HbC        | Hagerstown silty clay loam, 8 to 15 percent slopes-----           | 11,426 | 1.8     |
| HbD        | Hagerstown silty clay loam, 15 to 30 percent slopes-----          | 2,259  | 0.4     |
| Hc         | Hagerstown-Urban land complex-----                                | 7,475  | 1.2     |
| HfA        | Hollinger silt loam, 0 to 3 percent slopes-----                   | 258    | #       |
| HfB        | Hollinger silt loam, 3 to 8 percent slopes-----                   | 3,388  | 0.5     |
| HfC        | Hollinger silt loam, 8 to 15 percent slopes-----                  | 2,423  | 0.4     |
| HfD        | Hollinger silt loam, 15 to 25 percent slopes-----                 | 345    | 0.1     |
| Hg         | Holly silt loam-----                                              | 2,603  | 0.4     |
| LaB        | Lansdale loam, 3 to 8 percent slopes-----                         | 7,681  | 1.2     |
| LaC        | Lansdale loam, 8 to 15 percent slopes-----                        | 5,866  | 0.9     |
| LaD        | Lansdale loam, 15 to 25 percent slopes-----                       | 2,357  | 0.4     |
| LbB        | Lehigh silt loam, 3 to 8 percent slopes-----                      | 1,768  | 0.3     |
| LbC        | Lehigh silt loam, 8 to 15 percent slopes-----                     | 279    | #       |
| LdA        | Letort silt loam, 0 to 3 percent slopes-----                      | 810    | 0.1     |
| LdB        | Letort silt loam, 3 to 8 percent slopes-----                      | 15,940 | 2.6     |
| LdC        | Letort silt loam, 8 to 15 percent slopes-----                     | 3,835  | 0.6     |
| Lg         | Linden silt loam-----                                             | 1,578  | 0.3     |
| Ln         | Lindside silt loam-----                                           | 8,701  | 1.4     |
| MaB        | Manor silt loam, 3 to 8 percent slopes-----                       | 8,102  | 1.3     |
| MaC        | Manor silt loam, 8 to 15 percent slopes-----                      | 13,199 | 2.1     |
| MaD        | Manor silt loam, 15 to 25 percent slopes-----                     | 13,756 | 2.2     |
| MbB        | Manor very stony silt loam, 3 to 8 percent slopes-----            | 1,423  | 0.2     |
| MbD        | Manor very stony silt loam, 8 to 25 percent slopes-----           | 8,008  | 1.3     |
| MbF        | Manor very stony silt loam, 25 to 60 percent slopes-----          | 17,168 | 2.8     |
| MdB        | Mount Lucas silt loam, 3 to 8 percent slopes-----                 | 1,044  | 0.2     |
| MeB        | Mount Lucas very stony silt loam, 3 to 12 percent slopes-----     | 1,961  | 0.3     |
| Nc, Nd     | Newark silt loam-----                                             | 9,900  | 1.6     |

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

| Map symbol | Soil name                                                        | Acres   | Percent |
|------------|------------------------------------------------------------------|---------|---------|
| Ne         | Nolin silt loam-----                                             | 2,243   | 0.4     |
| Pa         | Penlaw silt loam-----                                            | 1,257   | 0.2     |
| PeC        | Pequea silt loam, 8 to 15 percent slopes-----                    | 4,990   | 0.8     |
| PeD        | Pequea silt loam, 15 to 25 percent slopes-----                   | 5,585   | 0.9     |
| PeE        | Pequea silt loam, 25 to 50 percent slopes-----                   | 2,561   | 0.4     |
| Qu         | Pits, quarry-----                                                | 1,391   | 0.2     |
| RaB        | Readington silt loam, 3 to 10 percent slopes-----                | 5,170   | 0.8     |
| RbB        | Readington extremely stony silt loam, 3 to 8 percent slopes----- | 1,346   | 0.2     |
| Rd         | Rowland silt loam-----                                           | 2,589   | 0.4     |
| UaB        | Ungers loam, 3 to 8 percent slopes-----                          | 8,198   | 1.3     |
| UaC        | Ungers loam, 8 to 15 percent slopes-----                         | 5,449   | 0.9     |
| UaD        | Ungers loam, 15 to 25 percent slopes-----                        | 1,086   | 0.2     |
| UbB        | Ungers extremely stony loam, 3 to 8 percent slopes-----          | 3,372   | 0.5     |
| UbD        | Ungers extremely stony loam, 8 to 25 percent slopes-----         | 17,409  | 2.8     |
| UbE        | Ungers extremely stony loam, 25 to 50 percent slopes-----        | 4,124   | 0.7     |
| Uc         | Urban land-----                                                  | 8,292   | 1.3     |
| Ud         | Udorthents, loamy-----                                           | 1,222   | 0.2     |
| W          | Water-----                                                       | 17,860  | 2.9     |
|            | Total-----                                                       | 623,360 | 100.0   |

\* Less than 0.1 percent.



TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland]

| Map symbol | Soil name                                           |
|------------|-----------------------------------------------------|
| BdA        | Bedington silt loam, 0 to 3 percent slopes          |
| BdB        | Bedington silt loam, 3 to 8 percent slopes          |
| BrB        | Brecknock gravelly silt loam, 3 to 8 percent slopes |
| BuA        | Bucks silt loam, 0 to 3 percent slopes              |
| BuB        | Bucks silt loam, 3 to 8 percent slopes              |
| CbA        | Chester silt loam, 0 to 3 percent slopes            |
| CbB        | Chester silt loam, 3 to 8 percent slopes            |
| CkA        | Clarksburg silt loam, 0 to 5 percent slopes         |
| Cm         | Comus silt loam                                     |
| CnA        | Conestoga silt loam, 0 to 3 percent slopes          |
| CnB        | Conestoga silt loam, 3 to 8 percent slopes          |
| DbA        | Duffield silt loam, 0 to 3 percent slopes           |
| DbB        | Duffield silt loam, 3 to 8 percent slopes           |
| EcA        | Elk silt loam, 0 to 3 percent slopes                |
| EcB        | Elk silt loam, 3 to 8 percent slopes                |
| GbB        | Glenelg silt loam, 3 to 8 percent slopes            |
| GdB        | Glenville silt loam, 3 to 8 percent slopes          |
| HaA        | Hagerstown silt loam, 0 to 3 percent slopes         |
| HaB        | Hagerstown silt loam, 3 to 8 percent slopes         |
| HfA        | Hollinger silt loam, 0 to 3 percent slopes          |
| HfB        | Hollinger silt loam, 3 to 8 percent slopes          |
| LaB        | Lansdale loam, 3 to 8 percent slopes                |
| LbB        | Lehigh silt loam, 3 to 8 percent slopes             |
| LdA        | Letort silt loam, 0 to 3 percent slopes             |
| LdB        | Letort silt loam, 3 to 8 percent slopes             |
| Lg         | Linden silt loam                                    |
| Ln         | Lindside silt loam                                  |
| MaB        | Manor silt loam, 3 to 8 percent slopes              |
| MdB        | Mount Lucas silt loam, 3 to 8 percent slopes        |
| Ne         | Nolin silt loam                                     |
| Rd         | Rowland silt loam                                   |
| UaB        | Ungers loam, 3 to 8 percent slopes                  |

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

| Soil name and<br>map symbol | Corn      | Corn silage | Tobacco    | Wheat     | Alfalfa hay | Grass-<br>legume hay | Pasture     |
|-----------------------------|-----------|-------------|------------|-----------|-------------|----------------------|-------------|
|                             | <u>Bu</u> | <u>Tons</u> | <u>Lbs</u> | <u>Bu</u> | <u>Tons</u> | <u>Tons</u>          | <u>AUM*</u> |
| AbB-----<br>Abbottstown     | 95        | 19          | ---        | ---       | ---         | 3.0                  | 6.0         |
| AsB-----<br>Abbottstown     | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Ba-----<br>Baile            | ---       | ---         | ---        | ---       | ---         | 2.0                  | 4.0         |
| BdA-----<br>Bedington       | 130       | 26          | 2,400      | 50        | 5.0         | 3.5                  | 7.0         |
| BdB-----<br>Bedington       | 130       | 26          | 2,400      | 50        | 5.0         | 3.5                  | 7.0         |
| BdC-----<br>Bedington       | 120       | 24          | 2,300      | 45        | 4.5         | 3.5                  | 7.0         |
| BeD-----<br>Bedington       | 105       | 21          | ---        | 40        | 4.0         | 3.0                  | 6.0         |
| Bm-----<br>Blairton         | 75        | 15          | ---        | 35        | ---         | 2.5                  | 5.0         |
| Bo-----<br>Bowmansville     | 115       | 20          | ---        | ---       | ---         | 3.0                  | 6.0         |
| BrB-----<br>Brecknock       | 110       | 20          | 2,100      | 40        | 3.5         | 3.0                  | 6.0         |
| BrC-----<br>Brecknock       | 90        | 19          | 2,100      | 35        | 3.0         | 2.5                  | 5.0         |
| BsB, BsC-----<br>Brecknock  | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| BuA-----<br>Bucks           | 135       | 27          | 2,400      | 50        | 5.5         | 3.5                  | 7.0         |
| BuB-----<br>Bucks           | 135       | 27          | 2,400      | 50        | 5.5         | 3.5                  | 7.0         |
| BuC-----<br>Bucks           | 125       | 25          | 2,300      | 45        | 5.0         | 3.5                  | 7.0         |
| BuD-----<br>Bucks           | 110       | 22          | ---        | 40        | 4.5         | 3.0                  | 6.0         |
| BxC-----<br>Bucks           | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| CbA-----<br>Chester         | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| CbB-----<br>Chester         | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| CbC-----<br>Chester         | 125       | 25          | 2,400      | 45        | 5.0         | 3.5                  | 7.0         |
| CkA-----<br>Clarksburg      | 100       | 20          | 2,300      | 40        | 3.5         | 3.0                  | 6.0         |

See footnote at end of table.



TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

| Soil name and<br>map symbol               | Corn      | Corn silage | Tobacco    | Wheat     | Alfalfa hay | Grass-<br>legume hay | Pasture     |
|-------------------------------------------|-----------|-------------|------------|-----------|-------------|----------------------|-------------|
|                                           | <u>Bu</u> | <u>Tons</u> | <u>Lbs</u> | <u>Bu</u> | <u>Tons</u> | <u>Tons</u>          | <u>AUM*</u> |
| ClB, ClD-----<br>Clymer                   | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| ClF-----<br>Clymer                        | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Cm-----<br>Comus                          | 135       | 27          | 2,600      | 50        | 5.5         | 3.5                  | 7.0         |
| CnA-----<br>Conestoga                     | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| CnB-----<br>Conestoga                     | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| CnC-----<br>Conestoga                     | 125       | 25          | 2,400      | 45        | 5.0         | 3.5                  | 7.0         |
| DbA-----<br>Duffield                      | 135       | 27          | 2,500      | 50        | 5.0         | 3.5                  | 7.0         |
| DbB-----<br>Duffield                      | 130       | 27          | 2,500      | 50        | 5.0         | 3.5                  | 7.0         |
| EcA-----<br>Elk                           | 110       | 27          | 2,500      | 45        | 5.5         | 3.5                  | 7.0         |
| EcB-----<br>Elk                           | 135       | 27          | 2,500      | 45        | 5.5         | 3.5                  | 7.0         |
| EcC-----<br>Elk                           | 125       | 25          | 2,400      | 40        | 5.0         | 3.0                  | 6.0         |
| Eu-----<br>Elk-Urban land                 | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Ff-----<br>Fluvaquents and<br>Udifluvents | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| GbB-----<br>Glenelg                       | 130       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 10.5        |
| GbC-----<br>Glenelg                       | 120       | 25          | 2,400      | 45        | 5.0         | 3.5                  | 9.5         |
| GbD-----<br>Glenelg                       | 105       | 22          | ---        | 40        | 4.5         | 3.0                  | 8.5         |
| GdB-----<br>Glenville                     | 100       | 20          | 1,675      | 40        | 3.5         | 3.0                  | 6.5         |
| HaA-----<br>Hagerstown                    | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| HaB-----<br>Hagerstown                    | 135       | 27          | 2,500      | 50        | 5.5         | 3.5                  | 7.0         |
| HbC-----<br>Hagerstown                    | 120       | 24          | 2,400      | 40        | 4.5         | 3.5                  | 7.0         |
| HbD-----<br>Hagerstown                    | 110       | 22          | ---        | 35        | 4.0         | 3.0                  | 6.0         |
| Hc-----<br>Hagerstown-Urban land          | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

| Soil name and<br>map symbol | Corn      | Corn silage | Tobacco    | Wheat     | Alfalfa hay | Grass-<br>legume hay | Pasture     |
|-----------------------------|-----------|-------------|------------|-----------|-------------|----------------------|-------------|
|                             | <u>Bu</u> | <u>Tons</u> | <u>Lbs</u> | <u>Bu</u> | <u>Tons</u> | <u>Tons</u>          | <u>AUM*</u> |
| HfA-----<br>Hollinger       | 130       | 27          | 2,500      | 50        | 4.5         | 3.5                  | 7.0         |
| HfB-----<br>Hollinger       | 130       | 27          | 2,500      | 50        | 4.5         | 3.5                  | 7.0         |
| HfC-----<br>Hollinger       | 120       | 25          | 2,400      | 45        | 4.0         | 3.5                  | 7.0         |
| HfD-----<br>Hollinger       | 105       | 22          | ---        | 40        | 3.5         | 3.0                  | 6.0         |
| Hg-----<br>Holly            | 100       | 18          | ---        | ---       | ---         | 2.5                  | ---         |
| LaB-----<br>Lansdale        | 120       | 22          | 2,300      | 45        | 4.5         | 3.0                  | 6.0         |
| LaC-----<br>Lansdale        | 110       | 21          | 2,200      | 40        | 4.0         | 3.0                  | 6.0         |
| LaD-----<br>Lansdale        | 100       | 20          | ---        | 35        | 3.5         | 2.5                  | 5.0         |
| LbB-----<br>Lehigh          | 95        | 21          | ---        | ---       | ---         | 3.0                  | 6.0         |
| LbC-----<br>Lehigh          | 90        | 19          | ---        | ---       | ---         | 3.0                  | 6.0         |
| LdA-----<br>Letort          | 135       | 27          | 2,500      | 50        | 4.5         | 3.5                  | 7.0         |
| LdB-----<br>Letort          | 135       | 27          | 2,500      | 50        | 4.5         | 3.5                  | 7.0         |
| LdC-----<br>Letort          | 125       | 25          | 2,400      | 45        | 4.0         | 3.5                  | 7.0         |
| Lg-----<br>Linden           | 120       | 26          | 2,500      | 45        | 4.5         | 3.5                  | ---         |
| Ln-----<br>Lindside         | 125       | 25          | 2,500      | 40        | 4.5         | 3.5                  | 7.0         |
| MaB-----<br>Manor           | 120       | 20          | 2,400      | 40        | 3.5         | 3.0                  | 6.0         |
| MaC-----<br>Manor           | 115       | 19          | 2,300      | 35        | 3.0         | 2.5                  | 5.0         |
| MaD-----<br>Manor           | 105       | 18          | ---        | 30        | 3.0         | 2.0                  | 4.0         |
| MbB, MbD-----<br>Manor      | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| MbF-----<br>Manor           | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| MdB-----<br>Mount Lucas     | 105       | 21          | ---        | 45        | 4.0         | 3.0                  | 6.0         |
| MeB-----<br>Mount Lucas     | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Nc, Nd-----<br>Newark       | 100       | 20          | ---        | 45        | ---         | 3.5                  | 7.0         |

See footnote at end of table.



TABLE 6--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

| Soil name and<br>map symbol  | Corn      | Corn silage | Tobacco    | Wheat     | Alfalfa hay | Grass-<br>legume hay | Pasture     |
|------------------------------|-----------|-------------|------------|-----------|-------------|----------------------|-------------|
|                              | <u>Bu</u> | <u>Tons</u> | <u>Lbs</u> | <u>Bu</u> | <u>Tons</u> | <u>Tons</u>          | <u>AUM*</u> |
| Ne-----<br>Nolin             | 135       | 24          | 2,500      | 41        | ---         | 3.5                  | 9.0         |
| Pa-----<br>Penlaw            | 95        | 19          | 2,200      | 40        | 3.0         | 3.0                  | 6.0         |
| PeC-----<br>Pequea           | 100       | 20          | 2,400      | 35        | 3.5         | 3.0                  | 6.5         |
| PeD-----<br>Pequea           | 80        | 16          | ---        | 35        | 3.0         | 2.5                  | 5.5         |
| PeE-----<br>Pequea           | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Qu**.<br>Pits                |           |             |            |           |             |                      |             |
| RaB-----<br>Readington       | 105       | 21          | 2,100      | 45        | 3.5         | 3.0                  | 6.5         |
| RbB-----<br>Readington       | ---       | ---         | 2,100      | ---       | ---         | ---                  | ---         |
| Rd-----<br>Rowland           | 130       | 25          | 2,300      | 45        | 4.5         | 3.5                  | 8.5         |
| UaB-----<br>Ungers           | 120       | 24          | 2,200      | 45        | 4.5         | 3.5                  | 8.5         |
| UaC-----<br>Ungers           | 110       | 22          | 2,300      | 40        | 4.0         | 3.0                  | 8.0         |
| UaD-----<br>Ungers           | 95        | 19          | ---        | 35        | 4.0         | 3.0                  | 8.0         |
| UbB, UbD, UbE-----<br>Ungers | ---       | ---         | ---        | ---       | ---         | ---                  | ---         |
| Uc**.<br>Urban land          |           |             |            |           |             |                      |             |
| Ud.<br>Udorthents            |           |             |            |           |             |                      |             |

\* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

\*\* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

| Class | Total<br>acreage | Major management concerns (Subclass) |                                |                                        |
|-------|------------------|--------------------------------------|--------------------------------|----------------------------------------|
|       |                  | Erosion<br>(e)<br><u>Acres</u>       | Wetness<br>(w)<br><u>Acres</u> | Soil<br>problem<br>(s)<br><u>Acres</u> |
| I     | 55,590           | ---                                  | ---                            | ---                                    |
| II    | 293,710          | 267,981                              | 25,729                         | ---                                    |
| III   | 121,135          | 102,365                              | 18,770                         | ---                                    |
| IV    | 43,980           | 41,377                               | 2,603                          | ---                                    |
| V     | 1,395            | ---                                  | 1,395                          | ---                                    |
| VI    | 24,604           | 3,647                                | ---                            | 20,957                                 |
| VII   | 44,746           | ---                                  | ---                            | 44,746                                 |
| VIII  | ---              | ---                                  | ---                            | ---                                    |



TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

| Soil name and map symbol        | Ordination symbol | Management concerns |                      |                    |                   | Potential productivity                                                                              |                             | Trees to plant                                                                                    |
|---------------------------------|-------------------|---------------------|----------------------|--------------------|-------------------|-----------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------|
|                                 |                   | Erosion hazard      | Equipment limitation | Seedling mortality | Wind-throw hazard | Common trees                                                                                        | Site index                  |                                                                                                   |
| AbB-----<br>Abbottstown         | 3w                | Slight              | Moderate             | Moderate           | Moderate          | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Red maple-----<br>Yellow-poplar----- | 70<br>70<br>70<br>80<br>--- | Yellow-poplar,<br>Japanese larch,<br>eastern white pine,<br>Norway spruce, white spruce.          |
| AsB-----<br>Abbottstown         | 3x                | Slight              | Moderate             | Moderate           | Moderate          | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Red maple-----<br>Yellow-poplar----- | 70<br>70<br>70<br>70<br>80  | Yellow-poplar,<br>Japanese larch,<br>eastern white pine,<br>Norway spruce,<br>eastern white pine. |
| Ba-----<br>Baile                | 1w                | Slight              | Severe               | Severe             | Slight            | Pin oak-----                                                                                        | 85                          | Eastern white pine,<br>Norway spruce, white spruce.                                               |
| BdA, BdB, BdC-----<br>Bedington | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                         | 75<br>85                    | Black walnut, yellow-poplar, eastern white pine, Japanese larch, Norway spruce, Virginia pine.    |
| BeD-----<br>Bedington           | 2r                | Moderate            | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                         | 75<br>85                    | Black walnut, yellow-poplar, eastern white pine, Japanese larch, Norway spruce, Virginia pine.    |
| Bm-----<br>Blairton             | 3w                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Yellow-poplar-----                   | 70<br>70<br>70<br>80        | Yellow-poplar,<br>Japanese larch,<br>eastern white pine,<br>Norway spruce.                        |
| Bo-----<br>Bowmansville         | 1w                | Slight              | Severe               | Severe             | Moderate          | Pin oak-----                                                                                        | 85                          | Eastern white pine, white spruce.                                                                 |
| BrB, BrC, BsB-----<br>Brecknock | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----<br>Shortleaf pine-----                                  | 68<br>65<br>---             | Eastern white pine, Virginia pine.                                                                |
| BsC-----<br>Brecknock           | 3r                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----<br>Shortleaf pine-----                                  | 68<br>65<br>---             | Eastern white pine, Virginia pine.                                                                |
| BuA, BuB, BuC-----<br>Bucks     | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                         | 68<br>80                    | Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, Virginia pine.                  |
| BuD-----<br>Bucks               | 3r                | Moderate            | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                         | 68<br>80                    | Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, Virginia pine.                  |
| BxC-----<br>Bucks               | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                         | 70<br>80                    | Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, Virginia pine.                  |
| CbA, CbB, CbC-----<br>Chester   | 2o                | Slight              | Slight               | Slight             | Slight            | Chestnut oak-----<br>Yellow-poplar-----<br>Virginia pine-----                                       | 77<br>83<br>80              | Black walnut, yellow-poplar, eastern white pine.                                                  |

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

| Soil name and map symbol        | Ordination symbol | Management concerns |                      |                    |                   | Potential productivity                                                                    |                      | Trees to plant                                                                                                |
|---------------------------------|-------------------|---------------------|----------------------|--------------------|-------------------|-------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------|
|                                 |                   | Erosion hazard      | Equipment limitation | Seedling mortality | Wind-throw hazard | Common trees                                                                              | Site index           |                                                                                                               |
| CkA-----<br>Clarksburg          | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----                                                | 89<br>96             | Eastern white pine,<br>yellow-poplar,<br>Japanese larch,<br>Norway spruce.                                    |
| ClB-----<br>Clymer              | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----<br>Eastern white pine--                        | 77<br>90<br>90       | Eastern white pine,<br>Virginia pine, black<br>cherry, yellow-<br>poplar.                                     |
| ClD-----<br>Clymer              | 2r                | Slight              | Moderate             | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----<br>Eastern white pine--                        | 83<br>95<br>---      | Eastern white pine,<br>black cherry, yellow-<br>poplar, Virginia<br>pine.                                     |
| ClF-----<br>Clymer              | 2r                | Moderate            | Severe               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----<br>Eastern white pine--                        | 83<br>95<br>---      | Eastern white pine,<br>black cherry, yellow-<br>poplar, Virginia<br>pine.                                     |
| Cm-----<br>Comus                | 1o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----                                                | 85<br>95             | Eastern white pine,<br>black walnut, yellow-<br>poplar.                                                       |
| CnA, CnB, CnC-----<br>Conestoga | 1o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----                                                | 85<br>95             | Yellow-poplar, eastern<br>white pine, black<br>walnut, Japanese<br>larch.                                     |
| DbA, DbB-----<br>Duffield       | 1o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----                                                | 85<br>95             | Yellow-poplar, black<br>walnut, Norway<br>spruce, Japanese<br>larch, eastern white<br>pine.                   |
| EcA, EcB, EcC-----<br>Elk       | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----<br>Shortleaf pine-----<br>Eastern white pine-- | 80<br>90<br>80<br>90 | Eastern white pine,<br>yellow-poplar, black<br>walnut, loblolly<br>pine.                                      |
| Eu*:<br>Elk-----                | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak----<br>Yellow-poplar-----<br>Shortleaf pine-----<br>Eastern white pine-- | 80<br>90<br>80<br>90 | Eastern white pine,<br>yellow-poplar, black<br>walnut, loblolly<br>pine.                                      |
| Urban land.                     |                   |                     |                      |                    |                   |                                                                                           |                      |                                                                                                               |
| GbB, GbC-----<br>Glenelg        | 2o                | Slight              | Slight               | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----         | 78<br>87<br>70<br>70 | Eastern white pine,<br>black walnut,<br>loblolly pine,<br>yellow-poplar,<br>Virginia pine,<br>Japanese larch. |
| GbD-----<br>Glenelg             | 2r                | Moderate            | Moderate             | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----         | 78<br>87<br>70<br>70 | Eastern white pine,<br>black walnut,<br>loblolly pine,<br>yellow-poplar,<br>Virginia pine,<br>Japanese larch. |
| GdB-----<br>Glenville           | 2w                | Slight              | Moderate             | Moderate           | Moderate          | Northern red oak----<br>White ash-----<br>Sugar maple-----<br>Yellow-poplar-----          | 80<br>80<br>80<br>90 | Yellow-poplar,<br>Japanese larch,<br>eastern white pine,<br>Norway spruce.                                    |

See footnote at end of table.



TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

| Soil name and map symbol         | Ordination symbol | Management concerns |                      |                    |                   | Potential productivity                                                                                                                              |                                         | Trees to plant                                                                                                 |
|----------------------------------|-------------------|---------------------|----------------------|--------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------|
|                                  |                   | Erosion hazard      | Equipment limitation | Seedling mortality | Wind-throw hazard | Common trees                                                                                                                                        | Site index                              |                                                                                                                |
| HaA, HaB, HbC-----<br>Hagerstown | 1c                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                                                                         | 85<br>95                                | Black walnut, yellow-poplar, eastern white pine, Norway spruce.                                                |
| HbD-----<br>Hagerstown           | 1c                | Moderate            | Severe               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                                                                         | 85<br>95                                | Black walnut, yellow-poplar, eastern white pine, Norway spruce.                                                |
| Hc*:<br>Hagerstown-----          | 1c                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                                                                                         | 85<br>95                                | Black walnut, yellow-poplar, eastern white pine, Norway spruce.                                                |
| Urban land.                      |                   |                     |                      |                    |                   |                                                                                                                                                     |                                         |                                                                                                                |
| HfA, HfB, HfC-----<br>Hollinger  | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----                                                                                   | 75<br>80<br>75                          | Yellow-poplar, Japanese larch, Virginia pine.                                                                  |
| HfD-----<br>Hollinger            | 2r                | Moderate            | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----                                                                                   | 75<br>80<br>75                          | Yellow-poplar, Japanese larch, Virginia pine.                                                                  |
| Hg-----<br>Holly                 | 2w                | Slight              | Severe               | Severe             | Moderate          | Pin oak-----<br>Swamp white oak-----<br>Red maple-----<br>Green ash-----<br>Black cherry-----<br>Eastern cottonwood--                               | 90<br>---<br>---<br>---<br>---<br>---   | Red maple, sweetgum, eastern cottonwood, green ash, American sycamore, pin oak, swamp white oak, silver maple. |
| LaB, LaC-----<br>Lansdale        | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                            | 70<br>75<br>70<br>70                    | Virginia pine, eastern white pine, shortleaf pine, yellow-poplar, Norway spruce.                               |
| LaD-----<br>Lansdale             | 3r                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                            | 70<br>75<br>70<br>70                    | Virginia pine, eastern white pine, shortleaf pine, yellow-poplar, Norway spruce.                               |
| LbB, LbC-----<br>Lehigh          | 3w                | Slight              | Moderate             | Moderate           | Moderate          | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Red maple-----<br>Yellow-poplar-----                                                 | 70<br>70<br>70<br>70<br>80              | Yellow-poplar, Japanese larch, Norway spruce, white spruce, eastern white pine.                                |
| LdA, LdB, LdC-----<br>Letort     | 2o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Sugar maple-----                                                                                     | 80<br>90<br>---                         | Eastern white pine, Japanese larch, black walnut, yellow-poplar, Virginia pine.                                |
| Lg-----<br>Linden                | 1o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Black cherry-----<br>Black walnut-----<br>Eastern white pine--<br>Yellow-poplar----- | 90<br>90<br>90<br>90<br>90<br>90<br>100 | Yellow-poplar, black walnut, black cherry, red pine, Japanese larch, Norway spruce, eastern white pine.        |

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

| Soil name and map symbol     | Ordination symbol | Management concerns |                      |                    |                   | Potential productivity                                                                                                              |                                      | Trees to plant                                                                                                                                                                            |
|------------------------------|-------------------|---------------------|----------------------|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                   | Erosion hazard      | Equipment limitation | Seedling mortality | Wind-throw hazard | Common trees                                                                                                                        | Site index                           |                                                                                                                                                                                           |
| Ln-----<br>Lindside          | 1o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Black walnut-----<br>White ash-----<br>White oak-----<br>Red maple-----              | 86<br>95<br>---<br>85<br>85<br>---   | Eastern white pine,<br>yellow-poplar, Norway<br>spruce, Japanese<br>larch, black walnut,<br>black oak, northern<br>red oak, shortleaf<br>pine, white ash,<br>white oak, Virginia<br>pine. |
| MaB-----<br>Manor            | 2o                | Slight              | Slight               | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MaC-----<br>Manor            | 2r                | Moderate            | Slight               | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MaD-----<br>Manor            | 2r                | Severe              | Moderate             | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MbB-----<br>Manor            | 2o                | Slight              | Slight               | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MbD-----<br>Manor            | 2r                | Moderate            | Moderate             | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MbF-----<br>Manor            | 2r                | Severe              | Severe               | Slight             | Slight            | Black oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine-----                                                   | 80<br>90<br>80<br>80                 | Yellow-poplar, eastern<br>white pine, Virginia<br>pine, loblolly pine.                                                                                                                    |
| MdB, MeB-----<br>Mount Lucas | 2w                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----                                                                   | 80<br>90<br>75                       | Eastern white pine,<br>yellow-poplar,<br>Virginia pine.                                                                                                                                   |
| Nc, Nd-----<br>Newark        | 1w                | Slight              | Moderate             | Slight             | Moderate          | Pin oak-----<br>Eastern cottonwood-----<br>Northern red oak-----<br>Yellow-poplar-----<br>Sweetgum-----                             | 99<br>94<br>85<br>95<br>88           | Eastern cottonwood,<br>sweetgum, post oak,<br>loblolly pine, red<br>maple, American<br>sycamore, eastern<br>white pine, yellow-<br>poplar.                                                |
| Ne-----<br>Nolin             | 1o                | Slight              | Slight               | Slight             | Slight            | Sweetgum-----<br>Yellow-poplar-----<br>Cherrybark oak-----<br>Eastern cottonwood-----<br>American sycamore-----<br>River birch----- | 92<br>107<br>97<br>---<br>---<br>--- |                                                                                                                                                                                           |
| Pa-----<br>Penlaw            | 2w                | Slight              | Moderate             | Moderate           | Moderate          | Northern red oak-----<br>White ash-----<br>Sugar maple-----<br>Red maple-----<br>Yellow-poplar-----                                 | 80<br>80<br>80<br>80<br>90           | Yellow-poplar,<br>Japanese larch,<br>Norway spruce, white<br>spruce, eastern white<br>pine.                                                                                               |
| PeC-----<br>Pequea           | 3r                | Moderate            | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Black oak-----<br>Virginia pine-----                                                 | 70<br>75<br>70<br>70                 | Virginia pine, eastern<br>white pine, Japanese<br>larch, Norway spruce.                                                                                                                   |

See footnote at end of table.



TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

| Soil name and map symbol | Ordination symbol | Management concerns |                      |                    |                   | Potential productivity                                                                   |                      | Trees to plant                                                                   |
|--------------------------|-------------------|---------------------|----------------------|--------------------|-------------------|------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------|
|                          |                   | Erosion hazard      | Equipment limitation | Seedling mortality | Wind-throw hazard | Common trees                                                                             | Site index           |                                                                                  |
| PeD-----<br>Pequea       | 3r                | Severe              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Black oak-----<br>Virginia pine-----      | 70<br>75<br>70<br>70 | Virginia pine, eastern white pine, Japanese larch, Norway spruce.                |
| PeE-----<br>Pequea       | 3r                | Severe              | Severe               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Black oak-----<br>Virginia pine-----      | 70<br>75<br>70<br>70 | Virginia pine, eastern white pine, Japanese larch, Norway spruce.                |
| RaB-----<br>Readington   | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine----- | 74<br>80<br>75<br>75 | Eastern white pine, Japanese larch, yellow-poplar, Norway spruce.                |
| RbB-----<br>Readington   | 3x                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----<br>Virginia pine-----<br>Shortleaf pine----- | 74<br>80<br>75<br>75 | Eastern white pine, Japanese larch, yellow-poplar, Norway spruce.                |
| Rd-----<br>Rowland       | 2w                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Yellow-poplar-----                                              | 80<br>95             | Eastern white pine, yellow-poplar, loblolly pine, Norway spruce, European larch. |
| UaB, UaC-----<br>Ungers  | 3o                | Slight              | Slight               | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----                                              | 62<br>60             | Eastern white pine, Virginia pine, Japanese larch, Norway spruce.                |
| UaD-----<br>Ungers       | 3r                | Moderate            | Moderate             | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----                                              | 62<br>60             | Eastern white pine, Virginia pine, Japanese larch, Norway spruce.                |
| UbB, UbD-----<br>Ungers  | 3x                | Slight              | Moderate             | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----                                              | 67<br>65             | Eastern white pine, Virginia pine.                                               |
| UbE-----<br>Ungers       | 3x                | Moderate            | Severe               | Slight             | Slight            | Northern red oak-----<br>Virginia pine-----                                              | 67<br>65             | Eastern white pine, Virginia pine.                                               |

\* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

| Soil name and map symbol | Camp areas                           | Picnic areas                         | Playgrounds                                         | Paths and trails                      | Golf fairways                               |
|--------------------------|--------------------------------------|--------------------------------------|-----------------------------------------------------|---------------------------------------|---------------------------------------------|
| AbB-----<br>Abbottstown  | Severe:<br>wetness.                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                 | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| AsB-----<br>Abbottstown  | Severe:<br>large stones,<br>wetness. | Severe:<br>large stones,<br>wetness. | Severe:<br>wetness,<br>large stones.                | Severe:<br>wetness.                   | Severe:<br>wetness.                         |
| Ba-----<br>Baile         | Severe:<br>wetness.                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                 | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| BdA-----<br>Bedington    | Slight-----                          | Slight-----                          | Moderate:<br>small stones.                          | Slight-----                           | Slight.                                     |
| BdB-----<br>Bedington    | Slight-----                          | Slight-----                          | Moderate:<br>slope,<br>small stones.                | Slight-----                           | Slight.                                     |
| BdC-----<br>Bedington    | Moderate:<br>slope.                  | Moderate:<br>slope.                  | Severe:<br>slope.                                   | Slight-----                           | Moderate:<br>slope.                         |
| BeD-----<br>Bedington    | Severe:<br>slope.                    | Severe:<br>slope.                    | Severe:<br>slope,<br>small stones.                  | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| Bm-----<br>Blairton      | Severe:<br>wetness.                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                 | Severe:<br>wetness.                   | Severe:<br>wetness.                         |
| Bo-----<br>Bowmansville  | Severe:<br>flooding,<br>wetness.     | Severe:<br>wetness.                  | Severe:<br>wetness,<br>flooding.                    | Severe:<br>wetness.                   | Severe:<br>wetness,<br>flooding.            |
| BrB-----<br>Brecknock    | Moderate:<br>small stones.           | Moderate:<br>small stones.           | Severe:<br>small stones.                            | Slight-----                           | Slight.                                     |
| BrC-----<br>Brecknock    | Moderate:<br>slope,<br>small stones. | Moderate:<br>slope,<br>small stones. | Severe:<br>slope,<br>small stones.                  | Slight-----                           | Moderate:<br>slope.                         |
| BsB-----<br>Brecknock    | Moderate:<br>large stones.           | Moderate:<br>large stones.           | Severe:<br>large stones,<br>small stones.           | Slight-----                           | Moderate:<br>small stones,<br>large stones. |
| BsC-----<br>Brecknock    | Severe:<br>slope.                    | Severe:<br>slope.                    | Severe:<br>large stones,<br>slope,<br>small stones. | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| BuA-----<br>Bucks        | Moderate:<br>percs slowly.           | Moderate:<br>percs slowly.           | Moderate:<br>percs slowly.                          | Slight-----                           | Slight.                                     |
| BuB-----<br>Bucks        | Moderate:<br>percs slowly.           | Moderate:<br>percs slowly.           | Moderate:<br>percs slowly,<br>slope.                | Slight-----                           | Slight.                                     |
| BuC-----<br>Bucks        | Moderate:<br>percs slowly,<br>slope. | Moderate:<br>percs slowly,<br>slope. | Severe:<br>slope.                                   | Slight-----                           | Moderate:<br>slope.                         |
| BuD-----<br>Bucks        | Severe:<br>slope.                    | Severe:<br>slope.                    | Severe:<br>slope.                                   | Moderate:<br>slope.                   | Severe:<br>slope.                           |



TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas                                            | Picnic areas                                          | Playgrounds                                         | Paths and trails          | Golf fairways                           |
|--------------------------|-------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|---------------------------|-----------------------------------------|
| BxC-----<br>Bucks        | Moderate:<br>large stones,<br>slope,<br>percs slowly. | Moderate:<br>large stones,<br>slope,<br>percs slowly. | Severe:<br>large stones,<br>slope.                  | Slight-----               | Moderate:<br>large stones,<br>slope.    |
| CbA-----<br>Chester      | Slight-----                                           | Slight-----                                           | Slight-----                                         | Slight-----               | Moderate:<br>large stones.              |
| CbB-----<br>Chester      | Slight-----                                           | Slight-----                                           | Moderate:<br>slope.                                 | Slight-----               | Moderate:<br>large stones.              |
| CbC-----<br>Chester      | Moderate:<br>slope.                                   | Moderate:<br>slope.                                   | Severe:<br>slope.                                   | Slight-----               | Moderate:<br>large stones,<br>slope.    |
| CkA-----<br>Clarksburg   | Moderate:<br>wetness.                                 | Moderate:<br>wetness.                                 | Moderate:<br>small stones.                          | Severe:<br>erodes easily. | Moderate:<br>wetness.                   |
| ClB-----<br>Clymer       | Moderate:<br>large stones.                            | Moderate:<br>large stones.                            | Severe:<br>large stones,<br>small stones.           | Moderate:<br>slope.       | Moderate:<br>droughty,<br>large stones. |
| ClD-----<br>Clymer       | Severe:<br>slope.                                     | Severe:<br>slope.                                     | Severe:<br>large stones,<br>slope,<br>small stones. | Moderate:<br>slope.       | Severe:<br>slope.                       |
| ClF-----<br>Clymer       | Severe:<br>slope.                                     | Severe:<br>slope.                                     | Severe:<br>large stones,<br>slope,<br>small stones. | Severe:<br>slope.         | Severe:<br>slope.                       |
| Cm-----<br>Comus         | Severe:<br>flooding.                                  | Slight-----                                           | Moderate:<br>small stones,<br>flooding.             | Slight-----               | Moderate:<br>flooding.                  |
| CnA-----<br>Conestoga    | Slight-----                                           | Slight-----                                           | Moderate:<br>small stones.                          | Slight-----               | Slight.                                 |
| CnB-----<br>Conestoga    | Slight-----                                           | Slight-----                                           | Moderate:<br>slope,<br>small stones.                | Slight-----               | Slight.                                 |
| CnC-----<br>Conestoga    | Moderate:<br>slope.                                   | Moderate:<br>slope.                                   | Severe:<br>slope.                                   | Slight-----               | Moderate:<br>slope.                     |
| DbA-----<br>Duffield     | Slight-----                                           | Slight-----                                           | Moderate:<br>small stones.                          | Slight-----               | Slight.                                 |
| DbB-----<br>Duffield     | Slight-----                                           | Slight-----                                           | Moderate:<br>slope,<br>small stones.                | Slight-----               | Slight.                                 |
| EcA-----<br>Elk          | Slight-----                                           | Slight-----                                           | Slight-----                                         | Slight-----               | Slight.                                 |
| EcB-----<br>Elk          | Slight-----                                           | Slight-----                                           | Moderate:<br>slope.                                 | Slight-----               | Slight.                                 |
| EcC-----<br>Elk          | Moderate:<br>slope.                                   | Moderate:<br>slope.                                   | Severe:<br>slope.                                   | Slight-----               | Moderate:<br>slope.                     |
| Eu#:<br>Elk-----         | Slight-----                                           | Slight-----                                           | Moderate:<br>slope.                                 | Slight-----               | Slight.                                 |

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas                       | Picnic areas        | Playgrounds                          | Paths and trails    | Golf fairways                        |
|--------------------------|----------------------------------|---------------------|--------------------------------------|---------------------|--------------------------------------|
| Eu*:<br>Urban land.      |                                  |                     |                                      |                     |                                      |
| Ff*:<br>Fluvaquents.     |                                  |                     |                                      |                     |                                      |
| Udifluvents.             |                                  |                     |                                      |                     |                                      |
| GbB-----<br>Glenelg      | Slight-----                      | Slight-----         | Moderate:<br>slope,<br>small stones. | Slight-----         | Slight.                              |
| GbC-----<br>Glenelg      | Moderate:<br>slope.              | Moderate:<br>slope. | Severe:<br>slope.                    | Slight-----         | Moderate:<br>slope.                  |
| GbD-----<br>Glenelg      | Severe:<br>slope.                | Severe:<br>slope.   | Severe:<br>slope.                    | Moderate:<br>slope. | Severe:<br>slope.                    |
| GdB-----<br>Glenville    | Severe:<br>wetness.              | Severe:<br>wetness. | Severe:<br>wetness.                  | Severe:<br>wetness. | Severe:<br>wetness.                  |
| HaA-----<br>Hagerstown   | Slight-----                      | Slight-----         | Moderate:<br>small stones.           | Slight-----         | Moderate:<br>large stones.           |
| HaB-----<br>Hagerstown   | Slight-----                      | Slight-----         | Moderate:<br>slope,<br>small stones. | Slight-----         | Moderate:<br>large stones.           |
| HbC-----<br>Hagerstown   | Moderate:<br>slope.              | Moderate:<br>slope. | Severe:<br>slope.                    | Slight-----         | Moderate:<br>large stones,<br>slope. |
| HbD-----<br>Hagerstown   | Severe:<br>slope.                | Severe:<br>slope.   | Severe:<br>slope.                    | Moderate:<br>slope. | Severe:<br>slope.                    |
| Hc*:<br>Hagerstown-----  | Slight-----                      | Slight-----         | Moderate:<br>slope,<br>small stones. | Slight-----         | Moderate:<br>large stones.           |
| Urban land.              |                                  |                     |                                      |                     |                                      |
| HfA-----<br>Hollinger    | Slight-----                      | Slight-----         | Moderate:<br>small stones.           | Slight-----         | Slight.                              |
| HfB-----<br>Hollinger    | Slight-----                      | Slight-----         | Moderate:<br>slope,<br>small stones. | Slight-----         | Slight.                              |
| HfC-----<br>Hollinger    | Moderate:<br>slope.              | Moderate:<br>slope. | Severe:<br>slope.                    | Slight-----         | Moderate:<br>slope.                  |
| HfD-----<br>Hollinger    | Severe:<br>slope.                | Severe:<br>slope.   | Severe:<br>slope.                    | Moderate:<br>slope. | Severe:<br>slope.                    |
| Hg-----<br>Holly         | Severe:<br>flooding,<br>wetness. | Severe:<br>wetness. | Severe:<br>wetness,<br>flooding.     | Severe:<br>wetness. | Severe:<br>wetness,<br>flooding.     |
| LaB-----<br>Lansdale     | Slight-----                      | Slight-----         | Moderate:<br>slope,<br>small stones. | Slight-----         | Slight.                              |
| LaC-----<br>Lansdale     | Moderate:<br>slope.              | Moderate:<br>slope. | Severe:<br>slope.                    | Slight-----         | Moderate:<br>slope.                  |

See footnote at end of table.



TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas                                  | Picnic areas                                | Playgrounds                                         | Paths and trails                      | Golf fairways                               |
|--------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------------|---------------------------------------|---------------------------------------------|
| LaD-----<br>Lansdale     | Severe:<br>slope.                           | Severe:<br>slope.                           | Severe:<br>slope.                                   | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| LbB-----<br>Lehigh       | Severe:<br>wetness.                         | Severe:<br>wetness.                         | Severe:<br>wetness.                                 | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| LbC-----<br>Lehigh       | Severe:<br>wetness.                         | Severe:<br>wetness.                         | Severe:<br>slope,<br>wetness.                       | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| LdA-----<br>Letort       | Slight-----                                 | Slight-----                                 | Slight-----                                         | Slight-----                           | Slight.                                     |
| LdB-----<br>Letort       | Slight-----                                 | Slight-----                                 | Moderate:<br>slope.                                 | Slight-----                           | Slight.                                     |
| LdC-----<br>Letort       | Moderate:<br>slope.                         | Moderate:<br>slope.                         | Severe:<br>slope.                                   | Slight-----                           | Moderate:<br>slope.                         |
| Lg-----<br>Linden        | Severe:<br>flooding.                        | Slight-----                                 | Moderate:<br>flooding.                              | Severe:<br>erodes easily.             | Moderate:<br>flooding.                      |
| Ln-----<br>Lindside      | Severe:<br>flooding.                        | Moderate:<br>wetness.                       | Moderate:<br>wetness,<br>flooding.                  | Moderate:<br>wetness.                 | Moderate:<br>flooding.                      |
| MaB-----<br>Manor        | Slight-----                                 | Slight-----                                 | Moderate:<br>slope,<br>small stones.                | Severe:<br>erodes easily.             | Slight.                                     |
| MaC-----<br>Manor        | Moderate:<br>slope.                         | Moderate:<br>slope.                         | Severe:<br>slope.                                   | Severe:<br>erodes easily.             | Moderate:<br>slope.                         |
| MaD-----<br>Manor        | Severe:<br>slope.                           | Severe:<br>slope.                           | Severe:<br>slope.                                   | Severe:<br>erodes easily.             | Severe:<br>slope.                           |
| MbB-----<br>Manor        | Moderate:<br>large stones,<br>small stones. | Moderate:<br>large stones,<br>small stones. | Severe:<br>large stones,<br>small stones.           | Slight-----                           | Moderate:<br>large stones,<br>small stones. |
| MbD-----<br>Manor        | Severe:<br>slope.                           | Severe:<br>slope.                           | Severe:<br>large stones,<br>small stones,<br>slope. | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| MbF-----<br>Manor        | Severe:<br>slope.                           | Severe:<br>slope.                           | Severe:<br>large stones,<br>small stones,<br>slope. | Severe:<br>slope.                     | Severe:<br>slope.                           |
| MdB-----<br>Mount Lucas  | Severe:<br>wetness.                         | Severe:<br>wetness.                         | Severe:<br>wetness.                                 | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| MeB-----<br>Mount Lucas  | Severe:<br>wetness.                         | Severe:<br>wetness.                         | Severe:<br>large stones,<br>small stones.           | Severe:<br>wetness.                   | Severe:<br>wetness.                         |
| Nc, Nd-----<br>Newark    | Severe:<br>flooding,<br>wetness.            | Severe:<br>wetness.                         | Severe:<br>wetness.                                 | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| Ne-----<br>Nolin         | Severe:<br>flooding.                        | Slight-----                                 | Moderate:<br>flooding.                              | Slight-----                           | Moderate:<br>flooding.                      |

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas                             | Picnic areas                           | Playgrounds                          | Paths and trails                      | Golf fairways                               |
|--------------------------|----------------------------------------|----------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------------|
| Pa-----<br>Penlaw        | Severe:<br>wetness.                    | Severe:<br>wetness.                    | Severe:<br>wetness.                  | Severe:<br>wetness,<br>erodes easily. | Severe:<br>wetness.                         |
| PeC-----<br>Pequea       | Moderate:<br>slope.                    | Moderate:<br>slope.                    | Severe:<br>slope.                    | Severe:<br>erodes easily.             | Moderate:<br>slope.                         |
| PeD-----<br>Pequea       | Severe:<br>slope.                      | Severe:<br>slope.                      | Severe:<br>slope.                    | Severe:<br>erodes easily.             | Severe:<br>slope.                           |
| PeE-----<br>Pequea       | Severe:<br>slope.                      | Severe:<br>slope.                      | Severe:<br>slope.                    | Severe:<br>erodes easily,<br>slope.   | Severe:<br>slope.                           |
| Qu*.<br>Pits             |                                        |                                        |                                      |                                       |                                             |
| RaB-----<br>Readington   | Moderate:<br>wetness,<br>percs slowly. | Moderate:<br>wetness.                  | Moderate:<br>slope,<br>small stones. | Severe:<br>erodes easily.             | Slight.                                     |
| RbB-----<br>Readington   | Severe:<br>large stones.               | Severe:<br>large stones.               | Severe:<br>large stones.             | Slight-----                           | Moderate:<br>small stones,<br>large stones. |
| Rd-----<br>Rowland       | Severe:<br>flooding,<br>wetness.       | Moderate:<br>wetness,<br>percs slowly. | Severe:<br>wetness.                  | Severe:<br>erodes easily.             | Moderate:<br>wetness,<br>flooding.          |
| UaB-----<br>Ungers       | Slight-----                            | Slight-----                            | Moderate:<br>slope,<br>small stones. | Slight-----                           | Slight.                                     |
| UaC-----<br>Ungers       | Moderate:<br>slope.                    | Moderate:<br>slope.                    | Severe:<br>slope.                    | Slight-----                           | Moderate:<br>slope.                         |
| UaD-----<br>Ungers       | Severe:<br>slope.                      | Severe:<br>slope.                      | Severe:<br>slope.                    | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| UbB-----<br>Ungers       | Severe:<br>large stones.               | Severe:<br>large stones.               | Severe:<br>large stones.             | Slight-----                           | Moderate:<br>large stones.                  |
| UbD-----<br>Ungers       | Severe:<br>slope,<br>large stones.     | Severe:<br>slope,<br>large stones.     | Severe:<br>slope,<br>large stones.   | Moderate:<br>slope.                   | Severe:<br>slope.                           |
| UbE-----<br>Ungers       | Severe:<br>slope,<br>large stones.     | Severe:<br>slope,<br>large stones.     | Severe:<br>slope,<br>large stones.   | Severe:<br>slope.                     | Severe:<br>slope.                           |
| Uc*.<br>Urban land       |                                        |                                        |                                      |                                       |                                             |
| Ud.<br>Udorthents        |                                        |                                        |                                      |                                       |                                             |

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

| Soil name and map symbol | Potential for habitat elements |                     |                          |                |                     |                |                     | Potential as habitat for-- |                   |                  |
|--------------------------|--------------------------------|---------------------|--------------------------|----------------|---------------------|----------------|---------------------|----------------------------|-------------------|------------------|
|                          | Grain and seed crops           | Grasses and legumes | Wild herba- ceous plants | Hardwood trees | Conif- erous plants | Wetland plants | Shallow water areas | Openland wildlife          | Woodland wildlife | Wetland wildlife |
| AbB-----<br>Abbottstown  | Fair                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| AsB-----<br>Abbottstown  | Very poor.                     | Very poor.          | Good                     | Good           | Good                | Poor           | Very poor.          | Poor                       | Good              | Very poor.       |
| Ba-----<br>Baile         | Poor                           | Fair                | Good                     | Fair           | Fair                | Good           | Fair                | Fair                       | Fair              | Fair.            |
| BdA-----<br>Bedington    | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| BdB-----<br>Bedington    | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| BdC-----<br>Bedington    | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| BeD-----<br>Bedington    | Poor                           | Fair                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| Bm-----<br>Blairton      | Fair                           | Fair                | Good                     | Good           | Good                | Poor           | Very poor.          | Fair                       | Good              | Very poor.       |
| Bo-----<br>Bowmansville  | Poor                           | Fair                | Fair                     | Fair           | Fair                | Good           | Fair                | Fair                       | Fair              | Fair.            |
| BrB-----<br>Brecknock    | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| BrC-----<br>Brecknock    | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| BsB-----<br>Brecknock    | Very poor.                     | Poor                | Good                     | Good           | Good                | Poor           | Very poor.          | Poor                       | Good              | Very poor.       |
| BsC-----<br>Brecknock    | Very poor.                     | Poor                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| BuA-----<br>Bucks        | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| BuB-----<br>Bucks        | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| BuC-----<br>Bucks        | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| BuD-----<br>Bucks        | Poor                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| BxC-----<br>Bucks        | Very poor.                     | Poor                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| CbA-----<br>Chester      | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| CbB-----<br>Chester      | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| CbC-----<br>Chester      | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |

TABLE 10.--WILDLIFE HABITAT--Continued

| Soil name and map symbol    | Potential for habitat elements |                     |                          |                |                     |                |                     | Potential as habitat for-- |                   |                  |
|-----------------------------|--------------------------------|---------------------|--------------------------|----------------|---------------------|----------------|---------------------|----------------------------|-------------------|------------------|
|                             | Grain and seed crops           | Grasses and legumes | Wild herba- ceous plants | Hardwood trees | Conif- erous plants | Wetland plants | Shallow water areas | Openland wildlife          | Woodland wildlife | Wetland wildlife |
| CkA-----<br>Clarksburg      | Good                           | Good                | Good                     | Good           | Good                | Poor           | Poor                | Good                       | Good              | Poor.            |
| ClB-----<br>Clymer          | Very poor.                     | Poor                | Good                     | Good           | Good                | Poor           | Very poor.          | Poor                       | Good              | Very poor.       |
| ClD-----<br>Clymer          | Very poor.                     | Poor                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| ClF-----<br>Clymer          | Very poor.                     | Very poor.          | Good                     | Good           | Good                | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| Cm-----<br>Comus            | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| CnA-----<br>Conestoga       | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| CnB-----<br>Conestoga       | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| CnC-----<br>Conestoga       | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| DbA-----<br>Duffield        | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| DbB-----<br>Duffield        | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| EcA-----<br>Elk             | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| EcB-----<br>Elk             | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| EcC-----<br>Elk             | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| Eu*:<br>Elk-----            | Fair                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| Urban land.                 |                                |                     |                          |                |                     |                |                     |                            |                   |                  |
| Pf*:<br>Fluvaquents.        |                                |                     |                          |                |                     |                |                     |                            |                   |                  |
| Udifluvents.                |                                |                     |                          |                |                     |                |                     |                            |                   |                  |
| GbB-----<br>Glenelg         | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| GbC-----<br>Glenelg         | Fair                           | Good                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| GbD-----<br>Glenelg         | Poor                           | Fair                | Good                     | Good           | Good                | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| GdB-----<br>Glenville       | Good                           | Good                | Good                     | Good           | Good                | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| HaA, HaB-----<br>Hagerstown | Good                           | Good                | Good                     | Good           | Good                | Poor           | Poor                | Good                       | Good              | Poor.            |

See footnote at end of table.



TABLE 10.--WILDLIFE HABITAT--Continued

| Soil name and map symbol               | Potential for habitat elements |                     |                             |                |                        |                |                     | Potential as habitat for-- |                   |                  |
|----------------------------------------|--------------------------------|---------------------|-----------------------------|----------------|------------------------|----------------|---------------------|----------------------------|-------------------|------------------|
|                                        | Grain and seed crops           | Grasses and legumes | Wild herba-<br>ceous plants | Hardwood trees | Conif-<br>erous plants | Wetland plants | Shallow water areas | Openland wildlife          | Woodland wildlife | Wetland wildlife |
| HbC-----<br>Hagerstown                 | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| HbD-----<br>Hagerstown                 | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| Hc*:<br>Hagerstown-----<br>Urban land. | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Poor                | Good                       | Good              | Poor.            |
| HfA-----<br>Hollinger                  | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| HfB-----<br>Hollinger                  | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| HfC-----<br>Hollinger                  | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| HfD-----<br>Hollinger                  | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| Hg-----<br>Holly                       | Poor                           | Fair                | Good                        | Good           | Fair                   | Good           | Good                | Fair                       | Good              | Good.            |
| LaB-----<br>Lansdale                   | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| LaC-----<br>Lansdale                   | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| LaD-----<br>Lansdale                   | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| LbB, LbC-----<br>Lehigh                | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| LdA-----<br>Letort                     | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| LdB-----<br>Letort                     | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| LdC-----<br>Letort                     | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| Lg-----<br>Linden                      | Good                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| Ln-----<br>Lindside                    | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Poor                | Good                       | Good              | Poor.            |
| MaB-----<br>Manor                      | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| MaC-----<br>Manor                      | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| MaD-----<br>Manor                      | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| MbB-----<br>Manor                      | Very poor.                     | Poor                | Good                        | Good           | Good                   | Poor           | Very poor.          | Poor                       | Good              | Very poor.       |

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

| Soil name and map symbol | Potential for habitat elements |                     |                             |                |                        |                |                     | Potential as habitat for-- |                   |                  |
|--------------------------|--------------------------------|---------------------|-----------------------------|----------------|------------------------|----------------|---------------------|----------------------------|-------------------|------------------|
|                          | Grain and seed crops           | Grasses and legumes | Wild herba-<br>ceous plants | Hardwood trees | Conif-<br>erous plants | Wetland plants | Shallow water areas | Openland wildlife          | Woodland wildlife | Wetland wildlife |
| MbD, MbF-----<br>Manor   | Very poor.                     | Poor                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| MdB-----<br>Mount Lucas  | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| MeB-----<br>Mount Lucas  | Very poor.                     | Poor                | Poor                        | Fair           | Fair                   | Very poor.     | Very poor.          | Poor                       | Fair              | Very poor.       |
| Nc, Nd-----<br>Newark    | Poor                           | Fair                | Fair                        | Good           | Good                   | Fair           | Fair                | Fair                       | Good              | Fair.            |
| Ne-----<br>Nolin         | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| Pa-----<br>Penlaw        | Fair                           | Good                | Good                        | Good           | Good                   | Fair           | Fair                | Good                       | Good              | Fair.            |
| PeC-----<br>Pequea       | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| PeD-----<br>Pequea       | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| PeE-----<br>Pequea       | Very poor.                     | Poor                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Poor                       | Good              | Very poor.       |
| Qu*.<br>Pits             |                                |                     |                             |                |                        |                |                     |                            |                   |                  |
| RaB-----<br>Readington   | Fair                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| RbB-----<br>Readington   | Very poor.                     | Very poor.          | Good                        | Good           | Good                   | Poor           | Very poor.          | Poor                       | Fair              | Very poor.       |
| Rd-----<br>Rowland       | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Poor                | Good                       | Good              | Poor.            |
| UaB-----<br>Ungers       | Good                           | Good                | Good                        | Good           | Good                   | Poor           | Very poor.          | Good                       | Good              | Very poor.       |
| UaC-----<br>Ungers       | Fair                           | Good                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Good                       | Good              | Very poor.       |
| UaD-----<br>Ungers       | Poor                           | Fair                | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Fair                       | Good              | Very poor.       |
| UbB-----<br>Ungers       | Very poor.                     | Very poor.          | Good                        | Good           | Good                   | Poor           | Very poor.          | Poor                       | Fair              | Very poor.       |
| UbD, UbE-----<br>Ungers  | Very poor.                     | Very poor.          | Good                        | Good           | Good                   | Very poor.     | Very poor.          | Poor                       | Fair              | Very poor.       |
| Uc*.<br>Urban land       |                                |                     |                             |                |                        |                |                     |                            |                   |                  |
| Ud.<br>Udorthents        |                                |                     |                             |                |                        |                |                     |                            |                   |                  |

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

| Soil name and map symbol     | Shallow excavations                   | Dwellings without basements          | Dwellings with basements              | Small commercial buildings           | Local roads and streets                                      | Lawns and landscaping                       |
|------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------------------------------|---------------------------------------------|
| AbB, AsB-----<br>Abbottstown | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness,<br>frost action.                         | Severe:<br>wetness.                         |
| Ba-----<br>Baile             | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness,<br>frost action.                         | Severe:<br>wetness.                         |
| BdA-----<br>Bedington        | Slight-----                           | Slight-----                          | Slight-----                           | Slight-----                          | Moderate:<br>frost action.                                   | Slight.                                     |
| BdB-----<br>Bedington        | Slight-----                           | Slight-----                          | Slight-----                           | Moderate:<br>slope.                  | Moderate:<br>frost action.                                   | Slight.                                     |
| BdC-----<br>Bedington        | Moderate:<br>slope.                   | Moderate:<br>slope.                  | Moderate:<br>slope.                   | Severe:<br>slope.                    | Moderate:<br>slope,<br>frost action.                         | Moderate:<br>slope.                         |
| BeD-----<br>Bedington        | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                                            | Severe:<br>slope.                           |
| Bm-----<br>Blairton          | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness.                   | Severe:<br>wetness.                  | Severe:<br>wetness,<br>frost action.                         | Severe:<br>wetness.                         |
| Bo-----<br>Bowmansville      | Severe:<br>cutbanks cave,<br>wetness. | Severe:<br>flooding,<br>wetness.     | Severe:<br>flooding,<br>wetness.      | Severe:<br>flooding,<br>wetness.     | Severe:<br>wetness,<br>flooding,<br>frost action.            | Severe:<br>wetness,<br>flooding.            |
| BrB-----<br>Brecknock        | Moderate:<br>depth to rock.           | Slight-----                          | Moderate:<br>depth to rock.           | Moderate:<br>slope.                  | Moderate:<br>frost action,<br>low strength.                  | Slight.                                     |
| BrC-----<br>Brecknock        | Moderate:<br>depth to rock,<br>slope. | Moderate:<br>slope.                  | Moderate:<br>depth to rock,<br>slope. | Severe:<br>slope.                    | Moderate:<br>slope,<br>frost action,<br>low strength.        | Moderate:<br>slope.                         |
| BsB-----<br>Brecknock        | Moderate:<br>depth to rock.           | Slight-----                          | Moderate:<br>depth to rock.           | Moderate:<br>slope.                  | Moderate:<br>frost action,<br>low strength.                  | Moderate:<br>small stones,<br>large stones. |
| BsC-----<br>Brecknock        | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                                            | Severe:<br>slope.                           |
| BuA-----<br>Bucks            | Slight-----                           | Moderate:<br>shrink-swell.           | Moderate:<br>shrink-swell.            | Moderate:<br>shrink-swell.           | Moderate:<br>low strength,<br>frost action,<br>shrink-swell. | Slight.                                     |
| BuB-----<br>Bucks            | Slight-----                           | Moderate:<br>shrink-swell.           | Moderate:<br>shrink-swell.            | Moderate:<br>shrink-swell,<br>slope. | Moderate:<br>low strength,<br>frost action,<br>shrink-swell. | Slight.                                     |
| BuC-----<br>Bucks            | Moderate:<br>slope.                   | Moderate:<br>shrink-swell,<br>slope. | Moderate:<br>shrink-swell,<br>slope.  | Severe:<br>slope.                    | Moderate:<br>low strength,<br>slope,<br>frost action.        | Moderate:<br>slope.                         |
| BuD-----<br>Bucks            | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                     | Severe:<br>slope.                    | Severe:<br>slope.                                            | Severe:<br>slope.                           |
| BxC-----<br>Bucks            | Moderate:<br>slope.                   | Moderate:<br>shrink-swell,<br>slope. | Moderate:<br>shrink-swell,<br>slope.  | Severe:<br>slope.                    | Moderate:<br>low strength,<br>frost action,<br>slope.        | Moderate:<br>large stones,<br>slope.        |

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations         | Dwellings without basements            | Dwellings with basements    | Small commercial buildings             | Local roads and streets                | Lawns and landscaping                   |
|--------------------------|-----------------------------|----------------------------------------|-----------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|
| CbA-----<br>Chester      | Slight-----                 | Slight-----                            | Slight-----                 | Slight-----                            | Moderate:<br>frost action.             | Moderate:<br>large stones.              |
| CbB-----<br>Chester      | Slight-----                 | Slight-----                            | Slight-----                 | Moderate:<br>slope.                    | Moderate:<br>frost action.             | Moderate:<br>large stones.              |
| CbC-----<br>Chester      | Moderate:<br>slope.         | Moderate:<br>slope.                    | Moderate:<br>slope.         | Severe:<br>slope.                      | Moderate:<br>slope,<br>frost action.   | Moderate:<br>large stones,<br>slope.    |
| CkA-----<br>Clarksburg   | Severe:<br>wetness.         | Moderate:<br>wetness,<br>shrink-swell. | Severe:<br>wetness.         | Moderate:<br>wetness,<br>shrink-swell. | Moderate:<br>low strength,<br>wetness. | Moderate:<br>wetness.                   |
| ClB-----<br>Clymer       | Moderate:<br>depth to rock. | Slight-----                            | Moderate:<br>depth to rock. | Moderate:<br>slope.                    | Moderate:<br>frost action.             | Moderate:<br>droughty,<br>large stones. |
| ClD, ClF-----<br>Clymer  | Severe:<br>slope.           | Severe:<br>slope.                      | Severe:<br>slope.           | Severe:<br>slope.                      | Severe:<br>slope.                      | Severe:<br>slope.                       |
| Cm-----<br>Comus         | Moderate:<br>flooding.      | Severe:<br>flooding.                   | Severe:<br>flooding.        | Severe:<br>flooding.                   | Severe:<br>flooding.                   | Moderate:<br>flooding.                  |
| CnA-----<br>Conestoga    | Slight-----                 | Slight-----                            | Slight-----                 | Slight-----                            | Severe:<br>low strength.               | Slight.                                 |
| CnB-----<br>Conestoga    | Slight-----                 | Slight-----                            | Slight-----                 | Moderate:<br>slope.                    | Severe:<br>low strength.               | Slight.                                 |
| CnC-----<br>Conestoga    | Moderate:<br>slope.         | Moderate:<br>slope.                    | Moderate:<br>slope.         | Severe:<br>slope.                      | Severe:<br>low strength.               | Moderate:<br>slope.                     |
| DbA-----<br>Duffield     | Slight-----                 | Moderate:<br>shrink-swell.             | Moderate:<br>shrink-swell.  | Moderate:<br>shrink-swell.             | Severe:<br>low strength.               | Slight.                                 |
| DbB-----<br>Duffield     | Slight-----                 | Moderate:<br>shrink-swell.             | Moderate:<br>shrink-swell.  | Moderate:<br>shrink-swell,<br>slope.   | Severe:<br>low strength.               | Slight.                                 |
| EcA-----<br>Elk          | Slight-----                 | Slight-----                            | Slight-----                 | Slight-----                            | Severe:<br>low strength.               | Slight.                                 |
| EcB-----<br>Elk          | Slight-----                 | Slight-----                            | Slight-----                 | Moderate:<br>slope.                    | Severe:<br>low strength.               | Slight.                                 |
| EcC-----<br>Elk          | Moderate:<br>slope.         | Moderate:<br>slope.                    | Moderate:<br>slope.         | Severe:<br>slope.                      | Severe:<br>low strength.               | Moderate:<br>slope.                     |
| Eu*:<br>Elk-----         | Slight-----                 | Slight-----                            | Slight-----                 | Moderate:<br>slope.                    | Severe:<br>low strength.               | Slight.                                 |
| Urban land.              |                             |                                        |                             |                                        |                                        |                                         |
| Ff*:<br>Fluvaquents.     |                             |                                        |                             |                                        |                                        |                                         |
| Udifluvents.             |                             |                                        |                             |                                        |                                        |                                         |
| GbB-----<br>Glenelg      | Slight-----                 | Slight-----                            | Slight-----                 | Moderate:<br>slope.                    | Moderate:<br>frost action.             | Slight.                                 |
| GbC-----<br>Glenelg      | Moderate:<br>slope.         | Moderate:<br>slope.                    | Moderate:<br>slope.         | Severe:<br>slope.                      | Moderate:<br>slope,<br>frost action.   | Moderate:<br>slope.                     |
| GbD-----<br>Glenelg      | Severe:<br>slope.           | Severe:<br>slope.                      | Severe:<br>slope.           | Severe:<br>slope.                      | Severe:<br>slope.                      | Severe:<br>slope.                       |

See footnote at end of table.



TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol                   | Shallow excavations                                  | Dwellings without basements          | Dwellings with basements                               | Small commercial buildings           | Local roads and streets                               | Lawns and landscaping                |
|--------------------------------------------|------------------------------------------------------|--------------------------------------|--------------------------------------------------------|--------------------------------------|-------------------------------------------------------|--------------------------------------|
| GdB-----<br>Glenville                      | Severe:<br>wetness.                                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                    | Severe:<br>wetness.                  | Severe:<br>wetness,<br>frost action.                  | Severe:<br>wetness.                  |
| HaA-----<br>Hagerstown                     | Moderate:<br>depth to rock,<br>too clayey.           | Moderate:<br>shrink-swell.           | Moderate:<br>depth to rock,<br>shrink-swell.           | Moderate:<br>shrink-swell.           | Severe:<br>low strength.                              | Moderate:<br>large stones.           |
| HaB-----<br>Hagerstown                     | Moderate:<br>depth to rock,<br>too clayey.           | Moderate:<br>shrink-swell.           | Moderate:<br>depth to rock,<br>shrink-swell.           | Moderate:<br>shrink-swell,<br>slope. | Severe:<br>low strength.                              | Moderate:<br>large stones.           |
| HbC-----<br>Hagerstown                     | Moderate:<br>depth to rock,<br>too clayey,<br>slope. | Moderate:<br>shrink-swell,<br>slope. | Moderate:<br>depth to rock,<br>slope,<br>shrink-swell. | Severe:<br>slope.                    | Severe:<br>low strength.                              | Moderate:<br>large stones,<br>slope. |
| HbD-----<br>Hagerstown                     | Severe:<br>slope.                                    | Severe:<br>slope.                    | Severe:<br>slope.                                      | Severe:<br>slope.                    | Severe:<br>low strength,<br>slope.                    | Severe:<br>slope.                    |
| Hc*:<br>Hagerstown-----<br><br>Urban land. | Moderate:<br>depth to rock,<br>too clayey.           | Moderate:<br>shrink-swell.           | Moderate:<br>depth to rock,<br>shrink-swell.           | Moderate:<br>shrink-swell,<br>slope. | Severe:<br>low strength.                              | Moderate:<br>large stones.           |
| HfA-----<br>Hollinger                      | Slight-----                                          | Slight-----                          | Slight-----                                            | Slight-----                          | Moderate:<br>frost action,<br>low strength.           | Slight.                              |
| HfB-----<br>Hollinger                      | Slight-----                                          | Slight-----                          | Slight-----                                            | Moderate:<br>slope.                  | Moderate:<br>frost action,<br>low strength.           | Slight.                              |
| HfC-----<br>Hollinger                      | Moderate:<br>slope.                                  | Moderate:<br>slope.                  | Moderate:<br>slope.                                    | Severe:<br>slope.                    | Moderate:<br>slope,<br>frost action,<br>low strength. | Moderate:<br>slope.                  |
| HfD-----<br>Hollinger                      | Severe:<br>slope.                                    | Severe:<br>slope.                    | Severe:<br>slope.                                      | Severe:<br>slope.                    | Severe:<br>slope.                                     | Severe:<br>slope.                    |
| Hg-----<br>Holly                           | Severe:<br>cutbanks cave,<br>wetness.                | Severe:<br>flooding,<br>wetness.     | Severe:<br>flooding,<br>wetness.                       | Severe:<br>flooding,<br>wetness.     | Severe:<br>wetness,<br>flooding,<br>frost action.     | Severe:<br>wetness,<br>flooding.     |
| LaB-----<br>Lansdale                       | Slight-----                                          | Slight-----                          | Slight-----                                            | Moderate:<br>slope.                  | Moderate:<br>frost action.                            | Slight.                              |
| LaC-----<br>Lansdale                       | Moderate:<br>slope.                                  | Moderate:<br>slope.                  | Moderate:<br>slope.                                    | Severe:<br>slope.                    | Moderate:<br>slope,<br>frost action.                  | Moderate:<br>slope.                  |
| LaD-----<br>Lansdale                       | Severe:<br>slope.                                    | Severe:<br>slope.                    | Severe:<br>slope.                                      | Severe:<br>slope.                    | Severe:<br>slope.                                     | Severe:<br>slope.                    |
| LbB-----<br>Lehigh                         | Severe:<br>wetness.                                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                    | Severe:<br>wetness.                  | Severe:<br>wetness,<br>frost action.                  | Severe:<br>wetness.                  |
| LbC-----<br>Lehigh                         | Severe:<br>wetness.                                  | Severe:<br>wetness.                  | Severe:<br>wetness.                                    | Severe:<br>wetness,<br>slope.        | Severe:<br>wetness,<br>frost action.                  | Severe:<br>wetness.                  |
| LdA-----<br>Letort                         | Slight-----                                          | Slight-----                          | Slight-----                                            | Slight-----                          | Moderate:<br>frost action,<br>low strength.           | Slight.                              |

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol     | Shallow excavations                   | Dwellings without basements      | Dwellings with basements              | Small commercial buildings       | Local roads and streets                                 | Lawns and landscaping                       |
|------------------------------|---------------------------------------|----------------------------------|---------------------------------------|----------------------------------|---------------------------------------------------------|---------------------------------------------|
| LdB-----<br>Letort           | Slight-----                           | Slight-----                      | Slight-----                           | Moderate:<br>slope.              | Moderate:<br>frost action,<br>low strength.             | Slight.                                     |
| LdC-----<br>Letort           | Moderate:<br>slope.                   | Moderate:<br>slope.              | Moderate:<br>slope.                   | Severe:<br>slope.                | Moderate:<br>slope,<br>frost action,<br>low strength.   | Moderate:<br>slope.                         |
| Lg-----<br>Linden            | Moderate:<br>flooding,<br>wetness.    | Severe:<br>flooding.             | Severe:<br>flooding.                  | Severe:<br>flooding.             | Severe:<br>flooding.                                    | Moderate:<br>flooding.                      |
| Ln-----<br>Lindside          | Severe:<br>wetness.                   | Severe:<br>flooding.             | Severe:<br>flooding,<br>wetness.      | Severe:<br>flooding.             | Severe:<br>flooding.                                    | Moderate:<br>flooding.                      |
| MaB-----<br>Manor            | Slight-----                           | Slight-----                      | Slight-----                           | Moderate:<br>slope.              | Moderate:<br>frost action.                              | Slight.                                     |
| MaC-----<br>Manor            | Moderate:<br>slope.                   | Moderate:<br>slope.              | Moderate:<br>slope.                   | Severe:<br>slope.                | Moderate:<br>slope,<br>frost action.                    | Moderate:<br>slope.                         |
| MaD-----<br>Manor            | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                                       | Severe:<br>slope.                           |
| MbB-----<br>Manor            | Slight-----                           | Slight-----                      | Slight-----                           | Moderate:<br>slope.              | Moderate:<br>frost action.                              | Moderate:<br>large stones,<br>small stones. |
| MbD, MbF-----<br>Manor       | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                                       | Severe:<br>slope.                           |
| MdB, MeB-----<br>Mount Lucas | Severe:<br>wetness.                   | Severe:<br>wetness.              | Severe:<br>wetness.                   | Severe:<br>wetness.              | Severe:<br>wetness,<br>frost action.                    | Severe:<br>wetness.                         |
| Nc, Nd-----<br>Newark        | Severe:<br>wetness.                   | Severe:<br>flooding,<br>wetness. | Severe:<br>flooding,<br>wetness.      | Severe:<br>flooding,<br>wetness. | Severe:<br>low strength,<br>wetness,<br>flooding.       | Severe:<br>wetness.                         |
| Ne-----<br>Nolin             | Moderate:<br>wetness,<br>flooding.    | Severe:<br>flooding.             | Severe:<br>flooding.                  | Severe:<br>flooding.             | Severe:<br>low strength,<br>flooding.                   | Moderate:<br>flooding.                      |
| Pa-----<br>Penlaw            | Severe:<br>wetness.                   | Severe:<br>wetness.              | Severe:<br>wetness.                   | Severe:<br>wetness.              | Severe:<br>low strength,<br>wetness,<br>frost action.   | Severe:<br>wetness.                         |
| PeC-----<br>Pequea           | Moderate:<br>depth to rock,<br>slope. | Moderate:<br>slope.              | Moderate:<br>depth to rock,<br>slope. | Severe:<br>slope.                | Moderate:<br>frost action,<br>slope.                    | Moderate:<br>slope.                         |
| PeD, PeE-----<br>Pequea      | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                                       | Severe:<br>slope.                           |
| Qu*.<br>Pits                 |                                       |                                  |                                       |                                  |                                                         |                                             |
| RaB-----<br>Readington       | Severe:<br>wetness.                   | Moderate:<br>wetness.            | Severe:<br>wetness.                   | Moderate:<br>wetness,<br>slope.  | Moderate:<br>low strength,<br>wetness,<br>frost action. | Slight.                                     |

See footnote at end of table.



TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

| Soil name and map symbol | Shallow excavations                   | Dwellings without basements      | Dwellings with basements         | Small commercial buildings       | Local roads and streets                                 | Lawns and landscaping                       |
|--------------------------|---------------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------------------------------|---------------------------------------------|
| RbB-----<br>Readington   | Severe:<br>wetness.                   | Moderate:<br>wetness.            | Severe:<br>wetness.              | Moderate:<br>wetness,<br>slope.  | Moderate:<br>low strength,<br>wetness,<br>frost action. | Moderate:<br>small stones,<br>large stones. |
| Rd-----<br>Rowland       | Severe:<br>cutbanks cave,<br>wetness. | Severe:<br>flooding,<br>wetness. | Severe:<br>flooding,<br>wetness. | Severe:<br>flooding,<br>wetness. | Severe:<br>flooding,<br>frost action.                   | Moderate:<br>wetness,<br>flooding.          |
| UaB-----<br>Ungers       | Slight-----                           | Slight-----                      | Slight-----                      | Moderate:<br>slope.              | Moderate:<br>frost action.                              | Slight.                                     |
| UaC-----<br>Ungers       | Moderate:<br>slope.                   | Moderate:<br>slope.              | Moderate:<br>slope.              | Severe:<br>slope.                | Moderate:<br>slope,<br>frost action.                    | Moderate:<br>slope.                         |
| UaD-----<br>Ungers       | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                | Severe:<br>slope.                | Severe:<br>slope.                                       | Severe:<br>slope.                           |
| UbB-----<br>Ungers       | Slight-----                           | Slight-----                      | Slight-----                      | Moderate:<br>slope.              | Moderate:<br>frost action.                              | Moderate:<br>large stones.                  |
| UbD, UbE-----<br>Ungers  | Severe:<br>slope.                     | Severe:<br>slope.                | Severe:<br>slope.                | Severe:<br>slope.                | Severe:<br>slope.                                       | Severe:<br>slope.                           |
| Uc*.<br>Urban land       |                                       |                                  |                                  |                                  |                                                         |                                             |
| Ud.<br>Udorthents        |                                       |                                  |                                  |                                  |                                                         |                                             |

\* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

| Soil name and map symbol     | Septic tank absorption fields                          | Sewage lagoon areas                               | Trench sanitary landfill                     | Area sanitary landfill                | Daily cover for landfill                          |
|------------------------------|--------------------------------------------------------|---------------------------------------------------|----------------------------------------------|---------------------------------------|---------------------------------------------------|
| AbB, AsB-----<br>Abbottstown | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>wetness.                               | Severe:<br>depth to rock,<br>wetness.        | Severe:<br>wetness.                   | Poor:<br>wetness,<br>thin layer.                  |
| Ba-----<br>Baile             | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>wetness.                               | Severe:<br>wetness.                          | Severe:<br>wetness.                   | Poor:<br>wetness.                                 |
| BdA-----<br>Bedington        | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Poor:<br>small stones.                            |
| BdB-----<br>Bedington        | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Poor:<br>small stones.                            |
| BdC-----<br>Bedington        | Moderate:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>slope.                                 | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock,<br>slope. | Poor:<br>small stones.                            |
| BeD-----<br>Bedington        | Severe:<br>slope.                                      | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.          | Severe:<br>slope.                     | Poor:<br>small stones,<br>slope.                  |
| Bm-----<br>Blairton          | Severe:<br>depth to rock,<br>wetness,<br>percs slowly. | Severe:<br>depth to rock,<br>wetness.             | Severe:<br>depth to rock,<br>wetness.        | Severe:<br>depth to rock,<br>wetness. | Poor:<br>area reclaim,<br>small stones.           |
| Bo-----<br>Bowmansville      | Severe:<br>flooding,<br>wetness,<br>percs slowly.      | Severe:<br>seepage,<br>flooding.                  | Severe:<br>flooding,<br>seepage,<br>wetness. | Severe:<br>flooding,<br>wetness.      | Poor:<br>wetness.                                 |
| BrB-----<br>Brecknock        | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>slope,<br>depth to rock. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Fair:<br>small stones,<br>area reclaim.           |
| BrC-----<br>Brecknock        | Moderate:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>slope.                                 | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock,<br>slope. | Fair:<br>small stones,<br>slope,<br>area reclaim. |
| BsB-----<br>Brecknock        | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>slope,<br>depth to rock. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Fair:<br>small stones,<br>area reclaim.           |
| BsC-----<br>Brecknock        | Severe:<br>wetness,<br>slope.                          | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.          | Severe:<br>slope.                     | Poor:<br>slope.                                   |
| BuA-----<br>Bucks            | Severe:<br>percs slowly.                               | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Fair:<br>area reclaim,<br>thin layer.             |
| BuB-----<br>Bucks            | Severe:<br>percs slowly.                               | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Fair:<br>area reclaim,<br>thin layer.             |



TABLE 12.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields                | Sewage lagoon areas                               | Trench sanitary landfill                     | Area sanitary landfill                | Daily cover for landfill                        |
|--------------------------|----------------------------------------------|---------------------------------------------------|----------------------------------------------|---------------------------------------|-------------------------------------------------|
| BuC-----<br>Bucks        | Severe:<br>percs slowly.                     | Severe:<br>slope.                                 | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock,<br>slope. | Fair:<br>area reclaim,<br>slope,<br>thin layer. |
| BuD-----<br>Bucks        | Severe:<br>percs slowly,<br>slope.           | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.          | Severe:<br>slope.                     | Poor:<br>slope.                                 |
| BxC-----<br>Bucks        | Severe:<br>percs slowly.                     | Severe:<br>slope.                                 | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock,<br>slope. | Fair:<br>area reclaim,<br>thin layer,<br>slope. |
| CbA-----<br>Chester      | Moderate:<br>percs slowly.                   | Moderate:<br>seepage.                             | Slight-----                                  | Slight-----                           | Fair:<br>small stones.                          |
| CbB-----<br>Chester      | Moderate:<br>percs slowly.                   | Moderate:<br>seepage,<br>slope.                   | Slight-----                                  | Slight-----                           | Fair:<br>small stones.                          |
| CbC-----<br>Chester      | Moderate:<br>percs slowly,<br>slope.         | Severe:<br>slope.                                 | Moderate:<br>slope.                          | Moderate:<br>slope.                   | Fair:<br>small stones,<br>slope.                |
| CkA-----<br>Clarksburg   | Severe:<br>wetness,<br>percs slowly.         | Severe:<br>wetness.                               | Severe:<br>wetness.                          | Moderate:<br>wetness.                 | Fair:<br>small stones.                          |
| ClB-----<br>Clymer       | Moderate:<br>depth to rock,<br>percs slowly. | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Poor:<br>small stones.                          |
| ClD, ClF-----<br>Clymer  | Severe:<br>slope.                            | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.          | Severe:<br>slope.                     | Poor:<br>small stones,<br>slope.                |
| Cm-----<br>Comus         | Severe:<br>flooding.                         | Severe:<br>seepage,<br>flooding.                  | Severe:<br>flooding,<br>seepage,<br>wetness. | Severe:<br>flooding,<br>seepage.      | Poor:<br>small stones.                          |
| CnA-----<br>Conestoga    | Moderate:<br>percs slowly.                   | Moderate:<br>seepage.                             | Moderate:<br>too clayey.                     | Slight-----                           | Poor:<br>hard to pack.                          |
| CnB-----<br>Conestoga    | Moderate:<br>percs slowly.                   | Moderate:<br>seepage,<br>slope.                   | Moderate:<br>too clayey.                     | Slight-----                           | Poor:<br>hard to pack.                          |
| CnC-----<br>Conestoga    | Moderate:<br>percs slowly,<br>slope.         | Severe:<br>slope.                                 | Moderate:<br>too clayey,<br>slope.           | Moderate:<br>slope.                   | Poor:<br>hard to pack.                          |
| DbA-----<br>Duffield     | Moderate:<br>depth to rock.                  | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Poor:<br>hard to pack.                          |
| DbB-----<br>Duffield     | Moderate:<br>depth to rock.                  | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                    | Moderate:<br>depth to rock.           | Poor:<br>hard to pack.                          |
| EcA-----<br>Elk          | Moderate:<br>percs slowly.                   | Moderate:<br>seepage.                             | Moderate:<br>too clayey.                     | Slight-----                           | Fair:<br>too clayey.                            |
| EcB-----<br>Elk          | Moderate:<br>percs slowly.                   | Moderate:<br>seepage,<br>slope.                   | Moderate:<br>too clayey.                     | Slight-----                           | Fair:<br>too clayey.                            |

TABLE 12.--SANITARY FACILITIES--Continued

| Soil name and map symbol   | Septic tank absorption fields                          | Sewage lagoon areas                               | Trench sanitary landfill                           | Area sanitary landfill                | Daily cover for landfill                        |
|----------------------------|--------------------------------------------------------|---------------------------------------------------|----------------------------------------------------|---------------------------------------|-------------------------------------------------|
| EcC-----<br>Elk            | Moderate:<br>slope,<br>percs slowly.                   | Severe:<br>slope.                                 | Moderate:<br>slope,<br>too clayey.                 | Moderate:<br>slope.                   | Fair:<br>slope,<br>too clayey.                  |
| Eu#:<br>Elk-----           | Moderate:<br>percs slowly.                             | Moderate:<br>seepage,<br>slope.                   | Moderate:<br>too clayey.                           | Slight-----                           | Fair:<br>too clayey.                            |
| Urban land.                |                                                        |                                                   |                                                    |                                       |                                                 |
| Ff#:<br>Fluvaquents.       |                                                        |                                                   |                                                    |                                       |                                                 |
| Udifluvents.               |                                                        |                                                   |                                                    |                                       |                                                 |
| GbB-----<br>Glenelg        | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                          | Moderate:<br>depth to rock.           | Poor:<br>small stones.                          |
| GbC-----<br>Glenelg        | Moderate:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>slope.                                 | Severe:<br>depth to rock.                          | Moderate:<br>depth to rock,<br>slope. | Poor:<br>small stones.                          |
| GbD-----<br>Glenelg        | Severe:<br>slope.                                      | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.                | Severe:<br>slope.                     | Poor:<br>small stones,<br>slope.                |
| GdB-----<br>Glenville      | Severe:<br>wetness,<br>percs slowly.                   | Moderate:<br>slope.                               | Severe:<br>wetness.                                | Severe:<br>wetness.                   | Poor:<br>wetness,<br>thin layer.                |
| HaA-----<br>Hagerstown     | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>depth to rock,<br>too clayey.           | Moderate:<br>depth to rock.           | Poor:<br>too clayey,<br>hard to pack.           |
| HaB-----<br>Hagerstown     | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>too clayey.           | Moderate:<br>depth to rock.           | Poor:<br>too clayey,<br>hard to pack.           |
| HbC-----<br>Hagerstown     | Moderate:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>too clayey.           | Moderate:<br>depth to rock,<br>slope. | Poor:<br>too clayey,<br>hard to pack.           |
| HbD-----<br>Hagerstown     | Severe:<br>slope.                                      | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope,<br>too clayey. | Severe:<br>slope.                     | Poor:<br>too clayey,<br>hard to pack,<br>slope. |
| Hc#:<br>Hagerstown-----    | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock,<br>too clayey.           | Moderate:<br>depth to rock.           | Poor:<br>too clayey,<br>hard to pack.           |
| Urban land.                |                                                        |                                                   |                                                    |                                       |                                                 |
| HfA, HfB-----<br>Hollinger | Moderate:<br>percs slowly.                             | Moderate:<br>seepage,<br>slope.                   | Slight-----                                        | Slight-----                           | Fair:<br>small stones.                          |
| HfC-----<br>Hollinger      | Moderate:<br>percs slowly,<br>slope.                   | Severe:<br>slope.                                 | Moderate:<br>slope.                                | Moderate:<br>slope.                   | Fair:<br>small stones,<br>slope.                |

See footnote at end of table.



TABLE 12.--SANITARY FACILITIES--Continued

| Soil name and map symbol | Septic tank absorption fields                          | Sewage lagoon areas                          | Trench sanitary landfill                        | Area sanitary landfill                       | Daily cover for landfill                          |
|--------------------------|--------------------------------------------------------|----------------------------------------------|-------------------------------------------------|----------------------------------------------|---------------------------------------------------|
| HfD-----<br>Hollinger    | Severe:<br>slope.                                      | Severe:<br>slope.                            | Severe:<br>slope.                               | Severe:<br>slope.                            | Poor:<br>slope.                                   |
| Hg-----<br>Holly         | Severe:<br>flooding,<br>wetness,<br>percs slowly.      | Severe:<br>seepage,<br>flooding,<br>wetness. | Severe:<br>flooding,<br>seepage,<br>wetness.    | Severe:<br>flooding,<br>seepage,<br>wetness. | Poor:<br>wetness.                                 |
| LaB-----<br>Lansdale     | Moderate:<br>depth to rock,<br>percs slowly.           | Severe:<br>seepage.                          | Severe:<br>depth to rock,<br>seepage.           | Severe:<br>seepage.                          | Fair:<br>area reclaim,<br>small stones.           |
| LaC-----<br>Lansdale     | Moderate:<br>depth to rock,<br>percs slowly,<br>slope. | Severe:<br>seepage,<br>slope.                | Severe:<br>depth to rock,<br>seepage.           | Severe:<br>seepage.                          | Fair:<br>area reclaim,<br>small stones,<br>slope. |
| LaD-----<br>Lansdale     | Severe:<br>slope.                                      | Severe:<br>seepage,<br>slope.                | Severe:<br>depth to rock,<br>seepage,<br>slope. | Severe:<br>seepage,<br>slope.                | Poor:<br>slope.                                   |
| LbB-----<br>Lehigh       | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>wetness.                          | Severe:<br>depth to rock,<br>wetness.           | Severe:<br>wetness.                          | Poor:<br>small stones,<br>wetness.                |
| LbC-----<br>Lehigh       | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>slope,<br>wetness.                | Severe:<br>depth to rock,<br>wetness.           | Severe:<br>wetness.                          | Poor:<br>small stones,<br>wetness.                |
| LdA-----<br>Letort       | Moderate:<br>percs slowly.                             | Moderate:<br>seepage.                        | Severe:<br>depth to rock.                       | Slight-----                                  | Fair:<br>too clayey.                              |
| LdB-----<br>Letort       | Moderate:<br>percs slowly.                             | Moderate:<br>seepage,<br>slope.              | Severe:<br>depth to rock.                       | Slight-----                                  | Fair:<br>too clayey.                              |
| LdC-----<br>Letort       | Moderate:<br>percs slowly,<br>slope.                   | Severe:<br>slope.                            | Severe:<br>depth to rock.                       | Moderate:<br>slope.                          | Fair:<br>too clayey,<br>slope.                    |
| Lg-----<br>Linden        | Severe:<br>flooding,<br>wetness,<br>poor filter.       | Severe:<br>flooding,<br>seepage.             | Severe:<br>wetness,<br>flooding,<br>seepage.    | Severe:<br>seepage,<br>flooding.             | Poor:<br>thin layer.                              |
| Ln-----<br>Lindside      | Severe:<br>flooding,<br>wetness.                       | Severe:<br>flooding,<br>wetness.             | Severe:<br>flooding,<br>wetness.                | Severe:<br>flooding,<br>wetness.             | Fair:<br>too clayey,<br>wetness.                  |
| MaB-----<br>Manor        | Moderate:<br>percs slowly.                             | Severe:<br>seepage.                          | Severe:<br>seepage.                             | Severe:<br>seepage.                          | Fair:<br>small stones.                            |
| MaC-----<br>Manor        | Moderate:<br>percs slowly,<br>slope.                   | Severe:<br>slope,<br>seepage.                | Severe:<br>seepage.                             | Severe:<br>seepage.                          | Fair:<br>small stones,<br>slope.                  |
| MaD-----<br>Manor        | Severe:<br>slope.                                      | Severe:<br>slope,<br>seepage.                | Severe:<br>seepage,<br>slope.                   | Severe:<br>slope,<br>seepage.                | Poor:<br>slope.                                   |
| MbB-----<br>Manor        | Moderate:<br>percs slowly.                             | Severe:<br>seepage.                          | Severe:<br>seepage.                             | Severe:<br>seepage.                          | Fair:<br>small stones.                            |
| MbD, MbF-----<br>Manor   | Severe:<br>slope.                                      | Severe:<br>slope,<br>seepage.                | Severe:<br>seepage,<br>slope.                   | Severe:<br>seepage,<br>slope.                | Poor:<br>slope.                                   |

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

| Soil name and map symbol     | Septic tank absorption fields                          | Sewage lagoon areas                               | Trench sanitary landfill                          | Area sanitary landfill                  | Daily cover for landfill                          |
|------------------------------|--------------------------------------------------------|---------------------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------------------------------|
| MdB, MeB-----<br>Mount Lucas | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>seepage,<br>wetness.                   | Severe:<br>depth to rock,<br>seepage,<br>wetness. | Severe:<br>seepage,<br>wetness.         | Poor:<br>small stones,<br>wetness.                |
| Nc, Nd-----<br>Newark        | Severe:<br>flooding,<br>wetness.                       | Severe:<br>flooding,<br>wetness.                  | Severe:<br>flooding,<br>wetness.                  | Severe:<br>flooding,<br>wetness.        | Poor:<br>wetness.                                 |
| Ne-----<br>Nolin             | Severe:<br>flooding.                                   | Severe:<br>flooding,<br>wetness.                  | Severe:<br>flooding,<br>wetness.                  | Severe:<br>flooding,<br>wetness.        | Fair:<br>too clayey.                              |
| Pa-----<br>Penlaw            | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>wetness.                               | Severe:<br>depth to rock,<br>wetness.             | Severe:<br>wetness.                     | Poor:<br>small stones,<br>wetness,<br>thin layer. |
| PeC-----<br>Pequea           | Moderate:<br>depth to rock,<br>slope.                  | Severe:<br>seepage,<br>slope.                     | Severe:<br>depth to rock,<br>seepage.             | Severe:<br>seepage.                     | Fair:<br>area reclaim,<br>small stones,<br>slope. |
| PeD, PeE-----<br>Pequea      | Severe:<br>slope.                                      | Severe:<br>seepage,<br>slope.                     | Severe:<br>depth to rock,<br>seepage,<br>slope.   | Severe:<br>seepage,<br>slope.           | Poor:<br>slope.                                   |
| Qu*.<br>Pits                 |                                                        |                                                   |                                                   |                                         |                                                   |
| RaB, RbB-----<br>Readington  | Severe:<br>wetness,<br>percs slowly.                   | Severe:<br>wetness.                               | Severe:<br>depth to rock,<br>wetness.             | Moderate:<br>depth to rock,<br>wetness. | Fair:<br>small stones,<br>area reclaim.           |
| Rd-----<br>Rowland           | Severe:<br>flooding,<br>wetness,<br>percs slowly.      | Severe:<br>seepage,<br>flooding,<br>wetness.      | Severe:<br>flooding,<br>seepage,<br>wetness.      | Severe:<br>flooding,<br>wetness.        | Poor:<br>wetness.                                 |
| UaB-----<br>Ungers           | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>depth to rock.                         | Moderate:<br>depth to rock.             | Fair:<br>small stones,<br>thin layer.             |
| UaC-----<br>Ungers           | Moderate:<br>slope,<br>depth to rock,<br>percs slowly. | Severe:<br>slope.                                 | Severe:<br>depth to rock.                         | Moderate:<br>depth to rock,<br>slope.   | Fair:<br>small stones,<br>thin layer,<br>slope.   |
| UaD-----<br>Ungers           | Severe:<br>slope.                                      | Severe:<br>slope.                                 | Severe:<br>depth to rock,<br>slope.               | Severe:<br>slope.                       | Poor:<br>slope.                                   |
| UbB-----<br>Ungers           | Moderate:<br>depth to rock,<br>percs slowly.           | Moderate:<br>slope,<br>depth to rock.             | Severe:<br>depth to rock.                         | Moderate:<br>depth to rock.             | Poor:<br>large stones.                            |
| UbD, UbE-----<br>Ungers      | Severe:<br>slope.                                      | Severe:<br>slope.                                 | Severe:<br>slope,<br>depth to rock.               | Severe:<br>slope.                       | Poor:<br>slope,<br>large stones.                  |
| Uc*.<br>Urban land           |                                                        |                                                   |                                                   |                                         |                                                   |
| Ud.<br>Udorthents            |                                                        |                                                   |                                                   |                                         |                                                   |

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

| Soil name and map symbol        | Roadfill                                                 | Sand                         | Gravel                       | Topsoil                                           |
|---------------------------------|----------------------------------------------------------|------------------------------|------------------------------|---------------------------------------------------|
| AbB, AsB-----<br>Abbottstown    | Poor:<br>wetness.                                        | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>wetness.                |
| Ba-----<br>Baile                | Poor:<br>wetness.                                        | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>wetness.                                 |
| BdA, BdB, BdC-----<br>Bedington | Fair:<br>area reclaim.                                   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.           |
| BeD-----<br>Bedington           | Fair:<br>area reclaim,<br>slope.                         | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope. |
| Bm-----<br>Blairton             | Poor:<br>area reclaim,<br>wetness.                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>wetness.                |
| Bo-----<br>Bowmansville         | Poor:<br>wetness,<br>low strength.                       | Poor:<br>excess fines.       | Poor:<br>excess fines.       | Poor:<br>area reclaim,<br>wetness.                |
| BrB, BrC, BsB-----<br>Brecknock | Fair:<br>area reclaim,<br>thin layer,<br>low strength.   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.           |
| BsC-----<br>Brecknock           | Fair:<br>area reclaim,<br>thin layer,<br>slope.          | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope. |
| BuA, BuB, BuC-----<br>Bucks     | Fair:<br>area reclaim,<br>low strength,<br>thin layer.   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>area reclaim.                            |
| BuD-----<br>Bucks               | Fair:<br>area reclaim,<br>low strength,<br>thin layer.   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>area reclaim.                            |
| BxC-----<br>Bucks               | Fair:<br>area reclaim,<br>low strength,<br>shrink-swell. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>area reclaim.                            |
| CbA, CbB, CbC-----<br>Chester   | Good-----                                                | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones.                            |
| CkA-----<br>Clarksburg          | Fair:<br>wetness,<br>shrink-swell.                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.           |
| ClB-----<br>Clymer              | Fair:<br>area reclaim,<br>thin layer.                    | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.           |
| ClD-----<br>Clymer              | Fair:<br>area reclaim,<br>thin layer,<br>slope.          | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope. |

TABLE 13.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol         | Roadfill                         | Sand                         | Gravel                       | Topsoil                                             |
|----------------------------------|----------------------------------|------------------------------|------------------------------|-----------------------------------------------------|
| ClF-----<br>Clymer               | Poor:<br>slope.                  | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope.   |
| Cm-----<br>Comus                 | Good-----                        | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.             |
| CnA, CnB-----<br>Conestoga       | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones,<br>area reclaim.             |
| CnC-----<br>Conestoga            | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones,<br>area reclaim,<br>slope.   |
| DbA, DbB-----<br>Duffield        | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones,<br>area reclaim.             |
| EcA, EcB-----<br>Elk             | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Good.                                               |
| EcC-----<br>Elk                  | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>slope.                                     |
| Eu*:<br>Elk-----                 | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Good.                                               |
| Urban land.                      |                                  |                              |                              |                                                     |
| Ff*:<br>Fluvaquents.             |                                  |                              |                              |                                                     |
| Udifluvents.                     |                                  |                              |                              |                                                     |
| GbB, GbC-----<br>Glenelg         | Fair:<br>area reclaim.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.             |
| GbD-----<br>Glenelg              | Fair:<br>area reclaim,<br>slope. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope.   |
| GdB-----<br>Glenville            | Poor:<br>wetness,<br>thin layer. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>wetness. |
| HaA, HaB, HbC-----<br>Hagerstown | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones.                              |
| HbD-----<br>Hagerstown           | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>slope.                    |
| Hc*:<br>Hagerstown-----          | Poor:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones.                              |
| Urban land.                      |                                  |                              |                              |                                                     |
| HfA, HfB-----<br>Hollinger       | Fair:<br>low strength.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Good.                                               |

See footnote at end of table.



TABLE 13.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol     | Roadfill                                        | Sand                         | Gravel                       | Topsoil                                             |
|------------------------------|-------------------------------------------------|------------------------------|------------------------------|-----------------------------------------------------|
| HfC-----<br>Hollinger        | Fair:<br>low strength.                          | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>slope.                                     |
| HfD-----<br>Hollinger        | Fair:<br>slope,<br>low strength.                | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Severe:<br>slope.                                   |
| Hg-----<br>Holly             | Poor:<br>wetness.                               | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>wetness.                                   |
| LaB, LaC-----<br>Lansdale    | Fair:<br>area reclaim,<br>thin layer.           | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.             |
| LaD-----<br>Lansdale         | Fair:<br>area reclaim,<br>thin layer,<br>slope. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope.   |
| LbB, LbC-----<br>Lehigh      | Poor:<br>wetness.                               | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>wetness. |
| LdA, LdB-----<br>Letort      | Good-----                                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones.                              |
| LdC-----<br>Letort           | Good-----                                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones,<br>slope.                    |
| Lg-----<br>Linden            | Good-----                                       | Probable-----                | Probable-----                | Fair:<br>thin layer.                                |
| Ln-----<br>Lindside          | Fair:<br>low strength,<br>wetness.              | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>too clayey.                                |
| MaB, MaC-----<br>Manor       | Good-----                                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones.                              |
| MaD-----<br>Manor            | Fair:<br>slope.                                 | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>slope.                    |
| MbB-----<br>Manor            | Good-----                                       | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones.                              |
| MbD-----<br>Manor            | Fair:<br>slope.                                 | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>slope.                    |
| MbF-----<br>Manor            | Poor:<br>slope.                                 | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>slope.                    |
| MdB, MeB-----<br>Mount Lucas | Poor:<br>wetness.                               | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>wetness. |
| Nc, Nd-----<br>Newark        | Poor:<br>low strength,<br>wetness.              | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>wetness.                                   |
| Ne-----<br>Nolin             | Poor:<br>low strength.                          | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Good.                                               |

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol    | Roadfill                                          | Sand                         | Gravel                       | Topsoil                                             |
|-----------------------------|---------------------------------------------------|------------------------------|------------------------------|-----------------------------------------------------|
| Pa-----<br>Penlaw           | Poor:<br>low strength,<br>wetness,<br>thin layer. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>wetness. |
| PeC-----<br>Pequea          | Fair:<br>area reclaim.                            | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Fair:<br>small stones,<br>slope.                    |
| PeD-----<br>Pequea          | Fair:<br>area reclaim,<br>slope.                  | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>slope.                                     |
| PeE-----<br>Pequea          | Poor:<br>slope.                                   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>slope.                                     |
| Qu*.<br>Pits                |                                                   |                              |                              |                                                     |
| RaB, RbB-----<br>Readington | Fair:<br>area reclaim,<br>thin layer,<br>wetness. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.             |
| Rd-----<br>Rowland          | Fair:<br>wetness,<br>thin layer.                  | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>area reclaim.                              |
| UaB, UaC-----<br>Ungers     | Fair:<br>area reclaim,<br>thin layer.             | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim.             |
| UaD-----<br>Ungers          | Fair:<br>area reclaim,<br>thin layer,<br>slope.   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>small stones,<br>area reclaim,<br>slope.   |
| UbB-----<br>Ungers          | Fair:<br>thin layer,<br>area reclaim.             | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>large stones.                              |
| UbD-----<br>Ungers          | Fair:<br>slope,<br>area reclaim,<br>thin layer.   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>slope,<br>large stones.                    |
| UbE-----<br>Ungers          | Poor:<br>slope.                                   | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>slope,<br>large stones.                    |
| Uc*.<br>Urban land          |                                                   |                              |                              |                                                     |
| Ud.<br>Udorthents           |                                                   |                              |                              |                                                     |

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

| Soil name and map symbol    | Limitations for--                        |                                |                                     | Features affecting--                |                                        |                                        |
|-----------------------------|------------------------------------------|--------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|----------------------------------------|
|                             | Pond reservoir areas                     | Embankments, dikes, and levees | Aquifer-fed excavated ponds         | Drainage                            | Terraces and diversions                | Grassed waterways                      |
| AbB-----<br>Abbottstown     | Moderate: depth to rock, slope.          | Severe: piping, wetness.       | Severe: no water.                   | Peres slowly, frost action, slope.  | Erodes easily, wetness, rooting depth. | Wetness, erodes easily, rooting depth. |
| AsB-----<br>Abbottstown     | Moderate: depth to rock, slope.          | Severe: piping, wetness.       | Severe: no water.                   | Peres slowly, frost action, slope.  | Large stones, rooting depth, wetness.  | Large stones, rooting depth, wetness.  |
| Ba-----<br>Baile            | Slight-----                              | Severe: piping, wetness.       | Severe: slow refill.                | Peres slowly, frost action.         | Erodes easily, wetness, peres slowly.  | Wetness, erodes easily, peres slowly.  |
| BdA-----<br>Bedington       | Moderate: seepage, depth to rock.        | Severe: piping.                | Severe: no water.                   | Deep to water                       | Large stones---                        | Large stones.                          |
| BdB-----<br>Bedington       | Moderate: seepage, depth to rock, slope. | Severe: piping.                | Severe: no water.                   | Deep to water                       | Large stones---                        | Large stones.                          |
| BdC, BeD-----<br>Bedington  | Severe: slope.                           | Severe: piping.                | Severe: no water.                   | Deep to water                       | Slope, large stones.                   | Large stones, slope.                   |
| Bm-----<br>Blairton         | Moderate: seepage, depth to rock, slope. | Severe: piping, wetness.       | Severe: no water.                   | Depth to rock, frost action, slope. | Depth to rock, wetness.                | Wetness, droughty.                     |
| Bo-----<br>Bowmansville     | Moderate: seepage.                       | Severe: piping, wetness.       | Severe: slow refill, cutbanks cave. | Flooding, frost action.             | Wetness-----                           | Wetness.                               |
| BrB-----<br>Brecknock       | Moderate: seepage, depth to rock, slope. | Severe: piping.                | Severe: no water.                   | Deep to water                       | Favorable-----                         | Favorable.                             |
| BrC-----<br>Brecknock       | Severe: slope.                           | Severe: piping.                | Severe: no water.                   | Deep to water                       | Slope-----                             | Slope.                                 |
| BsB-----<br>Brecknock       | Moderate: seepage, depth to rock, slope. | Severe: piping.                | Severe: no water.                   | Deep to water                       | Favorable-----                         | Favorable.                             |
| BsC-----<br>Brecknock       | Severe: slope.                           | Severe: piping.                | Severe: no water.                   | Deep to water                       | Slope-----                             | Slope.                                 |
| BuA-----<br>Bucks           | Moderate: seepage, depth to rock.        | Severe: piping.                | Severe: no water.                   | Deep to water                       | Erodes easily                          | Erodes easily.                         |
| BuB-----<br>Bucks           | Moderate: seepage, depth to rock, slope. | Severe: piping.                | Severe: no water.                   | Deep to water                       | Erodes easily                          | Erodes easily.                         |
| BuC, BuD, BxC-----<br>Bucks | Severe: slope.                           | Severe: piping.                | Severe: no water.                   | Deep to water                       | Slope, erodes easily.                  | Slope, erodes easily.                  |
| CbA-----<br>Chester         | Moderate: seepage.                       | Severe: piping.                | Severe: no water.                   | Deep to water                       | Erodes easily                          | Erodes easily.                         |
| CbB-----<br>Chester         | Moderate: seepage, slope.                | Severe: piping.                | Severe: no water.                   | Deep to water                       | Erodes easily                          | Erodes easily.                         |

TABLE 14.--WATER MANAGEMENT--Continued

| Soil name and map symbol | Limitations for--                                 |                                     |                             | Features affecting--    |                            |                                  |
|--------------------------|---------------------------------------------------|-------------------------------------|-----------------------------|-------------------------|----------------------------|----------------------------------|
|                          | Pond reservoir areas                              | Embankments, dikes, and levees      | Aquifer-fed excavated ponds | Drainage                | Terraces and diversions    | Grassed waterways                |
| CbC-----<br>Chester      | Severe:<br>slope.                                 | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Slope,<br>erodes easily.   | Slope,<br>erodes easily.         |
| CkA-----<br>Clarksburg   | Moderate:<br>seepage.                             | Severe:<br>piping.                  | Severe:<br>no water.        | Peres slowly---         | Wetness,<br>erodes easily. | Erodes easily,<br>rooting depth. |
| ClB-----<br>Clymer       | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Large stones---            | Large stones.                    |
| ClD, ClF-----<br>Clymer  | Severe:<br>slope.                                 | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Slope,<br>large stones.    | Large stones,<br>slope.          |
| Cm-----<br>Comus         | Severe:<br>seepage.                               | Severe:<br>seepage,<br>piping.      | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| CnA-----<br>Conestoga    | Moderate:<br>seepage.                             | Severe:<br>hard to pack.            | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| CnB-----<br>Conestoga    | Moderate:<br>seepage,<br>slope.                   | Severe:<br>hard to pack.            | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| CnC-----<br>Conestoga    | Severe:<br>slope.                                 | Severe:<br>hard to pack.            | Severe:<br>no water.        | Deep to water           | Slope-----                 | Slope.                           |
| DbA-----<br>Duffield     | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>piping,<br>hard to pack. | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| DbB-----<br>Duffield     | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>piping,<br>hard to pack. | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| EcA, EcB-----<br>Elk     | Moderate:<br>seepage.                             | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| EcC-----<br>Elk          | Moderate:<br>seepage.                             | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Slope-----                 | Slope.                           |
| Eu*:<br>Elk-----         | Moderate:<br>seepage.                             | Severe:<br>piping.                  | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| Urban land.              |                                                   |                                     |                             |                         |                            |                                  |
| Pf*:<br>Fluvaquents.     |                                                   |                                     |                             |                         |                            |                                  |
| Udifluvents.             |                                                   |                                     |                             |                         |                            |                                  |
| GbB-----<br>Glenelg      | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>seepage,<br>piping.      | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |
| GbC, GbD-----<br>Glenelg | Severe:<br>slope.                                 | Severe:<br>seepage,<br>piping.      | Severe:<br>no water.        | Deep to water           | Slope-----                 | Slope.                           |
| GdB-----<br>Glenville    | Moderate:<br>slope.                               | Severe:<br>piping,<br>wetness.      | Severe:<br>no water.        | Frost action,<br>slope. | Wetness,<br>rooting depth. | Wetness,<br>rooting depth.       |
| HaA-----<br>Hagerstown   | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>hard to pack.            | Severe:<br>no water.        | Deep to water           | Favorable-----             | Favorable.                       |

See footnote at end of table.



TABLE 14.--WATER MANAGEMENT--Continued

| Soil name and map symbol    | Limitations for--                        |                                   |                                     | Features affecting--               |                                |                                |
|-----------------------------|------------------------------------------|-----------------------------------|-------------------------------------|------------------------------------|--------------------------------|--------------------------------|
|                             | Pond reservoir areas                     | Embankments, dikes, and levees    | Aquifer-fed excavated ponds         | Drainage                           | Terraces and diversions        | Grassed waterways              |
| HaB-----<br>Hagerstown      | Moderate: seepage, depth to rock, slope. | Severe: hard to pack.             | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| HbC, HbD-----<br>Hagerstown | Severe: slope.                           | Severe: hard to pack.             | Severe: no water.                   | Deep to water                      | Slope-----                     | Slope.                         |
| Hc*:<br>Hagerstown-----     | Moderate: seepage, depth to rock, slope. | Severe: hard to pack.             | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| Urban land.                 |                                          |                                   |                                     |                                    |                                |                                |
| HfA-----<br>Hollinger       | Moderate: seepage.                       | Severe: seepage, piping.          | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| HfB-----<br>Hollinger       | Moderate: seepage, slope.                | Severe: seepage, piping.          | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| HfC, HfD-----<br>Hollinger  | Severe: slope.                           | Severe: seepage, piping.          | Severe: no water.                   | Deep to water                      | Slope-----                     | Slope.                         |
| Hg-----<br>Holly            | Severe: seepage.                         | Severe: piping, wetness, seepage. | Severe: slow refill, cutbanks cave. | Flooding, frost action.            | Wetness-----                   | Wetness.                       |
| LaB-----<br>Lansdale        | Severe: seepage.                         | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| LaC, LaD-----<br>Lansdale   | Severe: seepage, slope.                  | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Slope-----                     | Slope.                         |
| LbB-----<br>Lehigh          | Moderate: depth to rock, slope.          | Severe: piping, wetness.          | Severe: no water.                   | Percs slowly, frost action, slope. | Erodes easily, wetness.        | Wetness, erodes easily.        |
| LbC-----<br>Lehigh          | Severe: slope.                           | Severe: piping, wetness.          | Severe: no water.                   | Percs slowly, frost action, slope. | Slope, erodes easily, wetness. | Wetness, slope, erodes easily. |
| LdA-----<br>Letort          | Moderate: seepage.                       | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| LdB-----<br>Letort          | Moderate: seepage, slope.                | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Favorable-----                 | Favorable.                     |
| LdC-----<br>Letort          | Severe: slope.                           | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Slope-----                     | Slope.                         |
| Lg-----<br>Linden           | Severe: seepage.                         | Severe: piping.                   | Moderate: deep to water.            | Deep to water                      | Erodes easily                  | Erodes easily.                 |
| Ln-----<br>Lindside         | Moderate: seepage.                       | Severe: piping.                   | Severe: slow refill.                | Flooding, frost action.            | Wetness, erodes easily.        | Erodes easily.                 |
| MaB-----<br>Manor           | Severe: seepage.                         | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Erodes easily                  | Erodes easily.                 |
| MaC, MaD-----<br>Manor      | Severe: slope, seepage.                  | Severe: piping.                   | Severe: no water.                   | Deep to water                      | Slope, erodes easily.          | Slope, erodes easily.          |

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

| Soil name and map symbol     | Limitations for--                                 |                                |                                             | Features affecting--                     |                                              |                                              |
|------------------------------|---------------------------------------------------|--------------------------------|---------------------------------------------|------------------------------------------|----------------------------------------------|----------------------------------------------|
|                              | Pond reservoir areas                              | Embankments, dikes, and levees | Aquifer-fed excavated ponds                 | Drainage                                 | Terraces and diversions                      | Grassed waterways                            |
| MbB-----<br>Manor            | Severe:<br>seepage.                               | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Favorable-----                               | Favorable.                                   |
| MbD, MbF-----<br>Manor       | Severe:<br>seepage,<br>slope.                     | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Slope-----                                   | Slope.                                       |
| MdB, MeB-----<br>Mount Lucas | Severe:<br>seepage.                               | Severe:<br>piping,<br>wetness. | Severe:<br>no water.                        | Percs slowly,<br>frost action,<br>slope. | Wetness,<br>percs slowly.                    | Wetness,<br>percs slowly.                    |
| Nc, Nd-----<br>Newark        | Moderate:<br>seepage.                             | Severe:<br>piping,<br>wetness. | Moderate:<br>slow refill.                   | Flooding,<br>frost action.               | Erodes easily,<br>wetness.                   | Wetness,<br>erodes easily.                   |
| Ne-----<br>Nolin             | Severe:<br>seepage.                               | Severe:<br>piping.             | Moderate:<br>deep to water,<br>slow refill. | Deep to water                            | Erodes easily                                | Erodes easily.                               |
| Pa-----<br>Penlaw            | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>piping,<br>wetness. | Severe:<br>no water.                        | Percs slowly,<br>frost action.           | Erodes easily,<br>rooting depth.             | Wetness,<br>erodes easily,<br>rooting depth. |
| PeC, PeD, PeE-----<br>Pequea | Severe:<br>seepage,<br>slope.                     | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Erodes easily,<br>slope.                     | Erodes easily,<br>slope.                     |
| Qu*.<br>Pits                 |                                                   |                                |                                             |                                          |                                              |                                              |
| RaB-----<br>Readington       | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>piping.             | Severe:<br>no water.                        | Slope-----                               | Erodes easily,<br>wetness,<br>rooting depth. | Erodes easily,<br>rooting depth.             |
| RbB-----<br>Readington       | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>piping.             | Severe:<br>no water.                        | Slope-----                               | Wetness,<br>rooting depth,<br>large stones.  | Rooting depth,<br>large stones.              |
| Rd-----<br>Rowland           | Severe:<br>seepage.                               | Severe:<br>piping,<br>wetness. | Severe:<br>slow refill,<br>cutbanks cave.   | Flooding,<br>frost action.               | Erodes easily,<br>wetness.                   | Wetness,<br>erodes easily.                   |
| UaB-----<br>Ungers           | Moderate:<br>seepage,<br>depth to rock,<br>slope. | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Favorable-----                               | Favorable.                                   |
| UaC, UaD-----<br>Ungers      | Severe:<br>slope.                                 | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Slope-----                                   | Slope.                                       |
| UbB-----<br>Ungers           | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Large stones---                              | Large stones.                                |
| UbD, UbE-----<br>Ungers      | Moderate:<br>seepage,<br>depth to rock.           | Severe:<br>piping.             | Severe:<br>no water.                        | Deep to water                            | Large stones,<br>slope.                      | Slope,<br>large stones.                      |
| Uc*.<br>Urban land           |                                                   |                                |                                             |                                          |                                              |                                              |
| Ud.<br>Udorthents            |                                                   |                                |                                             |                                          |                                              |                                              |

\* See description of the map unit for composition and behavior characteristics of the map unit.





TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol            | Depth     | USDA texture                                                            | Classification       |                       | Frag-ments<br>> 3<br>inches | Percentage passing<br>sieve number-- |        |        |        | Liquid<br>limit | Plas-<br>ticity<br>index |
|-------------------------------------|-----------|-------------------------------------------------------------------------|----------------------|-----------------------|-----------------------------|--------------------------------------|--------|--------|--------|-----------------|--------------------------|
|                                     |           |                                                                         | Unified              | AASHTO                |                             | 4                                    | 10     | 40     | 200    |                 |                          |
|                                     | <u>In</u> |                                                                         |                      |                       | <u>Pct</u>                  |                                      |        |        |        | <u>Pct</u>      |                          |
| Bo-----<br>Bowmansville             | 0-7       | Silt loam-----                                                          | ML, SM               | A-4                   | 0-5                         | 95-100                               | 85-100 | 60-100 | 35-90  | ---             | ---                      |
|                                     | 7-35      | Silt loam, silty<br>clay loam, sandy<br>clay loam.                      | ML, CL,<br>SM, SC    | A-4, A-6,<br>A-7      | 0-5                         | 95-100                               | 85-100 | 80-100 | 40-90  | 30-45           | 8-15                     |
|                                     | 35-52     | Silty clay loam,<br>sandy loam,<br>gravelly silt<br>loam.               | ML, CL,<br>SM, MH    | A-6, A-7              | 0-10                        | 90-100                               | 65-100 | 60-100 | 35-100 | 35-55           | 15-25                    |
|                                     | 52-66     | Stratified sand<br>to gravel.                                           | ML, GM,<br>SM, CL-ML | A-2, A-1,<br>A-4      | 0-20                        | 40-85                                | 20-80  | 15-75  | 10-55  | <20             | NP-5                     |
| BrB, BrC-----<br>Brecknock          | 0-8       | Gravelly silt<br>loam.                                                  | ML, CL,<br>GM, GC    | A-4, A-6              | 0-10                        | 65-80                                | 60-70  | 50-65  | 40-65  | ---             | ---                      |
|                                     | 8-38      | Silt loam, clay<br>loam, channery<br>silt loam.                         | ML, GM, SM           | A-4, A-6,<br>A-2      | 0-15                        | 65-100                               | 50-95  | 40-85  | 30-85  | 25-40           | NP-13                    |
|                                     | 38-56     | Channery silt<br>loam, channery<br>loam, very<br>channery clay<br>loam. | GM, ML,<br>GP-GM, SM | A-4, A-2,<br>A-1, A-6 | 0-20                        | 20-90                                | 15-90  | 10-85  | 10-75  | 25-40           | NP-12                    |
|                                     | 56        | Weathered bedrock                                                       | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |
| BsB, BsC-----<br>Brecknock          | 0-8       | Very stony silt<br>loam.                                                | ML, CL,<br>GM, GC    | A-4, A-6              | 3-10                        | 65-100                               | 50-100 | 45-95  | 40-85  | ---             | ---                      |
|                                     | 8-38      | Silt loam, clay<br>loam, channery<br>silt loam.                         | ML, GM, SM           | A-4, A-6,<br>A-2      | 0-15                        | 65-100                               | 50-95  | 40-85  | 30-85  | 25-40           | NP-13                    |
|                                     | 38-56     | Channery silt<br>loam, channery<br>loam, very<br>channery clay<br>loam. | GM, ML,<br>GP-GM, SM | A-4, A-2,<br>A-1, A-6 | 0-20                        | 20-90                                | 15-90  | 10-85  | 10-75  | 25-40           | NP-12                    |
|                                     | 56        | Weathered bedrock                                                       | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |
| BuA, BuB, BuC,<br>BuD-----<br>Bucks | 0-6       | Silt loam-----                                                          | ML, CL,<br>CL-ML     | A-4                   | 0                           | 95-100                               | 95-100 | 85-95  | 65-90  | 15-30           | 3-10                     |
|                                     | 6-30      | Silt loam, silty<br>clay loam, shaly<br>loam.                           | ML, CL,<br>SM, SC    | A-4, A-6              | 0-3                         | 75-100                               | 60-90  | 55-90  | 40-85  | 20-40           | 3-15                     |
|                                     | 30-52     | Shaly silt loam,<br>silt loam, silty<br>clay loam.                      | ML, CL,<br>GM, SM    | A-4, A-2              | 5-15                        | 45-90                                | 35-85  | 30-80  | 25-75  | <25             | NP-10                    |
|                                     | 52        | Unweathered<br>bedrock.                                                 | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |
| BxC-----<br>Bucks                   | 0-6       | Very stony silt<br>loam.                                                | ML, CL,<br>CL-ML     | A-4                   | 3-15                        | 95-100                               | 90-100 | 85-95  | 65-90  | 15-30           | 3-10                     |
|                                     | 6-30      | Silt loam, silty<br>clay loam, shaly<br>loam.                           | ML, CL,<br>SM, SL    | A-4, A-6              | 0-5                         | 75-100                               | 60-90  | 55-90  | 40-85  | 20-40           | 5-15                     |
|                                     | 30-52     | Shaly silt loam,<br>silt loam, silty<br>clay loam.                      | ML, CL,<br>GM, SM    | A-4, A-2              | 5-15                        | 45-90                                | 35-85  | 30-80  | 25-75  | <35             | NP-10                    |
|                                     | 52        | Unweathered<br>bedrock.                                                 | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |
| CbA, CbB, CbC----<br>Chester        | 0-10      | Silt loam-----                                                          | ML, CL               | A-4, A-6,<br>A-7      | 0-10                        | 90-100                               | 90-100 | 75-90  | 55-75  | 32-40           | 8-12                     |
|                                     | 10-43     | Silty clay loam,<br>silt loam,<br>channery loam.                        | ML, CL,<br>SM, SC    | A-4, A-6,<br>A-7      | 0-10                        | 85-100                               | 55-100 | 50-95  | 40-70  | 30-50           | 8-17                     |
|                                     | 43-60     | Loam-----                                                               | SM, SC, ML           | A-2, A-4,<br>A-7      | 0-10                        | 80-100                               | 70-100 | 70-95  | 30-65  | <47             | <16                      |



TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol       | Depth     | USDA texture                                                     | Classification             |                       | Frag-ments<br>> 3<br>inches<br>Pct | Percentage passing<br>sieve number-- |        |        |        | Liquid<br>limit<br>Pct | Plas-<br>ticity<br>index |
|--------------------------------|-----------|------------------------------------------------------------------|----------------------------|-----------------------|------------------------------------|--------------------------------------|--------|--------|--------|------------------------|--------------------------|
|                                |           |                                                                  | Unified                    | AASHTO                |                                    | 4                                    | 10     | 40     | 200    |                        |                          |
| CkA-----<br>Clarksburg         | <u>In</u> |                                                                  |                            |                       |                                    |                                      |        |        |        |                        |                          |
|                                | 0-9       | Silt loam-----                                                   | ML                         | A-4, A-6              | 0-5                                | 90-100                               | 85-100 | 80-95  | 75-90  | 25-35                  | 2-11                     |
|                                | 9-22      | Loam, channery<br>silty clay loam,<br>gravelly silt<br>loam.     | ML, CL,<br>CL-ML           | A-4, A-6,<br>A-7      | 0-10                               | 80-100                               | 65-100 | 60-95  | 55-85  | 25-45                  | 6-20                     |
|                                | 22-52     | Silty clay loam,<br>channery loam,<br>gravelly silt<br>loam.     | CL-ML, CL,<br>SM-SC, SC    | A-4, A-6,<br>A-7      | 0-15                               | 75-100                               | 55-100 | 50-95  | 45-90  | 20-45                  | 4-20                     |
| ClB, ClD, ClF----<br>Clymer    | 52-60     | Clay, channery<br>loam, silty clay<br>loam.                      | CL, CH,<br>SM-SC, GC       | A-4, A-6,<br>A-7, A-2 | 0-20                               | 50-100                               | 20-100 | 15-95  | 15-90  | 20-52                  | 4-25                     |
|                                | 0-7       | Very stony loam                                                  | ML, SM, GM                 | A-4, A-2              | 3-30                               | 60-100                               | 50-95  | 45-90  | 30-85  | 10-30                  | NP-9                     |
|                                | 7-27      | Sandy loam,<br>channery loam,<br>channery clay<br>loam.          | GM, SM,<br>GC, ML          | A-2, A-4              | 0-20                               | 60-95                                | 50-95  | 45-85  | 30-60  | 14-32                  | NP-9                     |
|                                | 27-60     | Channery loam,<br>very channery<br>loam, channery<br>sandy loam. | GM, GP-GM,<br>GC, SM       | A-1, A-2,<br>A-3, A-4 | 10-30                              | 30-75                                | 25-70  | 20-60  | 5-40   | 14-32                  | NP-9                     |
| Cm-----<br>Comus               | 0-39      | Silt loam-----                                                   | ML, SM,<br>CL, SC          | A-2, A-4,<br>A-6      | 0-5                                | 85-100                               | 80-100 | 55-100 | 30-90  | 30-40                  | 6-15                     |
|                                | 39-60     | Stratified<br>gravelly sandy<br>loam to silty<br>clay loam.      | GM, SM,<br>ML, CL          | A-1, A-2,<br>A-4, A-6 | 0-20                               | 55-100                               | 45-100 | 25-100 | 15-95  | <40                    | NP-20                    |
| CnA, CnB, CnC----<br>Conestoga | 0-10      | Silt loam-----                                                   | ML                         | A-4                   | 0-5                                | 90-100                               | 85-100 | 80-100 | 70-90  | 20-30                  | NP-6                     |
|                                | 10-38     | Silt loam, silty<br>clay loam,<br>channery silt<br>loam.         | MH, CH, CL                 | A-7, A-6              | 0-10                               | 70-100                               | 65-100 | 60-100 | 55-95  | 35-60                  | 14-30                    |
|                                | 38-75     | Channery silt<br>loam, channery<br>loam, channery<br>sandy loam. | MH, GM,<br>SM, ML          | A-2, A-7,<br>A-6      | 0-15                               | 35-90                                | 35-85  | 30-80  | 25-75  | 35-60                  | 10-25                    |
| DbA, DbB-----<br>Duffield      | 0-10      | Silt loam-----                                                   | ML, CL,<br>CL-ML           | A-4, A-6,<br>A-7      | 0                                  | 85-100                               | 85-100 | 80-100 | 70-95  | 20-50                  | 5-20                     |
|                                | 10-45     | Silty clay loam,<br>silty clay,<br>shaly loam.                   | ML, CL,<br>MH, CH          | A-4, A-6,<br>A-7      | 0-10                               | 65-100                               | 60-100 | 55-100 | 55-95  | 30-55                  | 8-22                     |
|                                | 45-60     | Shaly silt loam,<br>loam, clay.                                  | MH, GM,<br>SM, ML          | A-7, A-5              | 0-20                               | 65-100                               | 50-95  | 45-90  | 40-90  | 40-60                  | 9-29                     |
| EcA, EcB, EcC----<br>Elk       | 0-10      | Silt loam-----                                                   | ML, CL,<br>CL-ML           | A-4                   | 0                                  | 95-100                               | 95-100 | 85-100 | 70-95  | 25-35                  | 3-10                     |
|                                | 10-48     | Silty clay loam,<br>silt loam.                                   | ML, CL,<br>CL-ML           | A-4, A-6              | 0                                  | 95-100                               | 90-100 | 85-100 | 75-100 | 25-40                  | 5-15                     |
|                                | 48-62     | Silty clay loam,<br>silt loam.                                   | ML, CL,<br>CL-ML,<br>SM-SC | A-4, A-6              | 0                                  | 75-100                               | 50-100 | 45-100 | 40-95  | 25-40                  | 5-15                     |
| Eu*:<br>Elk-----               | 0-10      | Silt loam-----                                                   | ML, CL,<br>CL-ML           | A-4                   | 0                                  | 95-100                               | 95-100 | 85-100 | 70-95  | 25-35                  | 3-10                     |
|                                | 10-48     | Silty clay loam,<br>silt loam.                                   | ML, CL,<br>CL-ML           | A-4, A-6              | 0                                  | 95-100                               | 90-100 | 85-100 | 75-100 | 25-40                  | 5-15                     |
|                                | 48-62     | Silty clay loam,<br>silt loam.                                   | ML, CL,<br>CL-ML,<br>SM-SC | A-4, A-6              | 0                                  | 75-100                               | 50-100 | 45-100 | 40-95  | 25-40                  | 5-15                     |
| Urban land.                    |           |                                                                  |                            |                       |                                    |                                      |        |        |        |                        |                          |
| Ff*:<br>Fluvaquents.           |           |                                                                  |                            |                       |                                    |                                      |        |        |        |                        |                          |

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol                | Depth                             | USDA texture                                                                                                                                                                                                         | Classification                                                                 |                                                   | Frag-ments<br>> 3<br>inches<br>Pct | Percentage passing<br>sieve number-- |                                      |                                   |                                  | Liquid<br>limit<br>Pct           | Plas-<br>ticity<br>index        |
|-----------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|---------------------------------|
|                                         |                                   |                                                                                                                                                                                                                      | Unified                                                                        | AASHTO                                            |                                    | 4                                    | 10                                   | 40                                | 200                              |                                  |                                 |
|                                         | <u>In</u>                         |                                                                                                                                                                                                                      |                                                                                |                                                   |                                    |                                      |                                      |                                   |                                  |                                  |                                 |
| Pf*:<br>Udifluvents.                    |                                   |                                                                                                                                                                                                                      |                                                                                |                                                   |                                    |                                      |                                      |                                   |                                  |                                  |                                 |
| GbB, GbC, GbD----<br>Glenelg            | 0-8<br>8-22<br><br>22-60          | Silt loam-----<br>Channery silt<br>loam, silty clay<br>loam, loam.<br>Loam, sandy loam,<br>channery loam.                                                                                                            | ML<br>GM, ML, SM<br>GM, SM, ML                                                 | A-4, A-6<br>A-4, A-6,<br>A-7<br>A-1, A-2,<br>A-4  | 0<br>0-10<br>0-50                  | 90-100<br>60-100<br>60-100           | 85-100<br>55-90<br>15-95             | 75-95<br>50-90<br>15-90           | 50-80<br>35-85<br>10-70          | 32-40<br>34-46<br><40            | 7-12<br>9-15<br>NP-6            |
| GdB-----<br>Glenville                   | 0-9<br>9-15<br><br>15-38<br>38-62 | Silt loam-----<br>Silt loam,<br>channery loam,<br>channery silty<br>clay loam.<br>Silt loam,<br>channery loam,<br>silty clay loam.<br>Channery fine<br>sandy loam,<br>channery loam,<br>very channery<br>sandy loam. | ML, SM<br>CL-ML, CL,<br>GM, SC<br>CL-ML, CL,<br>GM, SC<br>CL-ML, ML,<br>GM, SM | A-4<br>A-4, A-6<br>A-4, A-6<br>A-4, A-2,<br>A-1   | 0<br>0-10<br>0-10<br>0-20          | 85-100<br>70-100<br>65-100<br>45-90  | 85-100<br>60-100<br>60-100<br>20-75  | 70-95<br>60-95<br>55-95<br>10-75  | 45-80<br>45-80<br>45-80<br>5-65  | 25-35<br>25-40<br>25-40<br>25-35 | 3-10<br>5-13<br>5-13<br>5-10    |
| HaA, HaB-----<br>Hagerstown             | 0-10<br>10-20<br>20-60            | Silt loam-----<br>Clay, clay loam,<br>loam.<br>Clay, silty clay,<br>silty clay loam.                                                                                                                                 | CL, CL-ML<br>CL, CH<br>CH, CL                                                  | A-4, A-6,<br>A-7<br>A-7, A-6                      | 0-15<br>0-5<br>0-5                 | 85-100<br>90-100<br>85-100           | 80-100<br>80-100<br>80-100           | 80-100<br>75-100<br>75-100        | 70-95<br>55-95<br>75-95          | 25-50<br>48-65<br>30-70          | 5-25<br>26-34<br>15-40          |
| HbC, HbD-----<br>Hagerstown             | 0-10<br>10-20<br>20-60            | Silty clay loam<br>Clay, clay loam,<br>loam.<br>Clay, silty clay,<br>silty clay loam.                                                                                                                                | CL, CL-ML<br>CL, CH<br>CH, CL                                                  | A-4, A-6,<br>A-7<br>A-7, A-6                      | 0-15<br>0-5<br>0-5                 | 85-100<br>90-100<br>85-100           | 80-100<br>80-100<br>80-100           | 80-100<br>75-100<br>75-100        | 70-95<br>55-95<br>75-95          | 25-50<br>48-65<br>30-70          | 5-25<br>26-34<br>15-40          |
| Hc*:<br>Hagerstown-----                 | 0-10<br>10-20<br>20-60            | Silt loam-----<br>Clay, clay loam,<br>loam.<br>Clay, silty clay,<br>silty clay loam.                                                                                                                                 | CL, CL-ML<br>CL, CH<br>CH, CL                                                  | A-4, A-6,<br>A-7<br>A-7, A-6                      | 0-15<br>0-5<br>0-5                 | 85-100<br>90-100<br>85-100           | 80-100<br>80-100<br>80-100           | 80-100<br>75-100<br>75-100        | 70-95<br>55-95<br>75-95          | 25-50<br>48-65<br>30-70          | 5-25<br>26-34<br>15-40          |
| Urban land.                             |                                   |                                                                                                                                                                                                                      |                                                                                |                                                   |                                    |                                      |                                      |                                   |                                  |                                  |                                 |
| HfA, HfB, HfC,<br>HfD-----<br>Hollinger | 0-8<br>8-30<br><br>30-60          | Silt loam-----<br>Silt loam,<br>gravelly loam,<br>channery silt<br>loam.<br>Channery loamy<br>sand, fine sandy<br>loam.                                                                                              | ML<br>CL, GC,<br>SC, CL-ML<br>GM, SM,<br>GP-GM,<br>GM-GC                       | A-4, A-6<br>A-4, A-6,<br>A-2<br>A-2, A-1,<br>A-3  | 0<br>0-5<br>0-10                   | 90-100<br>65-100<br>30-100           | 75-90<br>50-100<br>15-100            | 65-90<br>45-90<br>10-55           | 50-80<br>30-80<br>5-30           | 20-30<br>20-39<br><20            | NP-6<br>4-15<br>NP-5            |
| Hg-----<br>Holly                        | 0-8<br>8-27<br>27-42<br>42-60     | Silt loam-----<br>Silt loam, loam,<br>sandy loam.<br>Silt loam, loam,<br>sandy loam.<br>Stratified silt<br>loam to gravelly<br>sand.                                                                                 | ML<br>ML, SM<br>ML, SM<br>ML, SM,<br>SP-SM                                     | A-4<br>A-4, A-6<br>A-4, A-2<br>A-4, A-2,<br>A-1-B | 0<br>0<br>0<br>0-5                 | 90-100<br>85-100<br>85-100<br>70-100 | 85-100<br>75-100<br>75-100<br>65-100 | 80-100<br>70-95<br>50-95<br>40-90 | 70-90<br>45-85<br>25-80<br>10-70 | 25-35<br>20-40<br>20-40<br>20-40 | 3-10<br>NP-14<br>NP-10<br>NP-10 |

See footnote at end of table.



TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol      | Depth     | USDA texture                                       | Classification             |                       | Frag-ments > 3 inches | Percentage passing sieve number-- |        |        |       | Liquid limit | Plas-ticity index |
|-------------------------------|-----------|----------------------------------------------------|----------------------------|-----------------------|-----------------------|-----------------------------------|--------|--------|-------|--------------|-------------------|
|                               |           |                                                    | Unified                    | AASHTO                |                       | 4                                 | 10     | 40     | 200   |              |                   |
|                               | <u>In</u> |                                                    |                            |                       | <u>Pct</u>            |                                   |        |        |       | <u>Pct</u>   |                   |
| LaB, LaC, LaD----<br>Lansdale | 0-8       | Loam-----                                          | SM, SC,<br>ML, CL          | A-2, A-4              | 0-2                   | 80-95                             | 75-90  | 60-80  | 30-70 | 20-30        | 3-10              |
|                               | 8-34      | Sandy loam, sandy clay loam, channery sandy loam.  | SM, SC,<br>ML, CL          | A-2, A-4              | 0-10                  | 60-90                             | 60-80  | 40-70  | 30-65 | 20-30        | 3-10              |
|                               | 34-46     | Channery sandy loam, very channery sandy loam.     | SM, SC,<br>GM, GC          | A-1, A-2,<br>A-4      | 0-20                  | 55-80                             | 50-70  | 40-60  | 15-40 | 20-30        | 2-8               |
|                               | 46        | Unweathered bedrock.                               | ---                        | ---                   | ---                   | ---                               | ---    | ---    | ---   | ---          | ---               |
| LbB, LbC-----<br>Lehigh       | 0-7       | Silt loam-----                                     | ML                         | A-4                   | 0                     | 80-100                            | 80-100 | 80-100 | 70-95 | ---          | ---               |
|                               | 7-40      | Very channery silt loam, channery silty clay loam. | ML, CL,<br>GM, GC          | A-4, A-6              | 0-10                  | 55-90                             | 45-85  | 40-80  | 40-70 | 29-40        | 5-15              |
|                               | 40-58     | Channery silty clay loam, very channery silt loam. | GM, GC,<br>ML, CL          | A-4, A-2,<br>A-6, A-1 | 0-20                  | 25-70                             | 15-65  | 10-60  | 10-55 | 29-40        | 5-15              |
|                               | 58        | Unweathered bedrock.                               | ---                        | ---                   | ---                   | ---                               | ---    | ---    | ---   | ---          | ---               |
| LdA, LdB, LdC-----<br>Letort  | 0-9       | Silt loam-----                                     | ML                         | A-4                   | 0                     | 90-100                            | 90-100 | 75-90  | 55-75 | 20-30        | NP-6              |
|                               | 9-32      | Loam, silt loam, silty clay loam.                  | ML                         | A-4, A-7,<br>A-6      | 0                     | 80-100                            | 80-100 | 65-95  | 50-70 | 30-45        | 3-12              |
|                               | 32-62     | Silt loam, channery sandy loam, channery loam.     | ML, SM                     | A-4, A-2              | 0-5                   | 80-100                            | 50-100 | 45-95  | 30-55 | 20-35        | NP-8              |
| Lg-----<br>Linden             | 0-10      | Silt loam-----                                     | ML, SM                     | A-4                   | 0                     | 80-100                            | 80-100 | 65-100 | 40-90 | ---          | ---               |
|                               | 10-50     | Silt loam, gravelly loam, sandy loam.              | ML, SM                     | A-4, A-2              | 0-5                   | 80-100                            | 65-100 | 40-95  | 25-90 | <30          | NP-3              |
|                               | 50-60     | Loam, gravelly sandy loam, very gravelly sand.     | SM, GM,<br>ML, SP-SM       | A-2, A-1,<br>A-3, A-4 | 0-20                  | 40-100                            | 30-100 | 15-90  | 5-75  | <25          | NP-5              |
| Ln-----<br>Lindside           | 0-10      | Silt loam-----                                     | ML, CL,<br>CL-ML           | A-4, A-6              | 0                     | 100                               | 95-100 | 80-100 | 55-90 | 20-35        | 2-15              |
|                               | 10-50     | Silty clay loam, silt loam, very fine sandy loam.  | CL, ML,<br>CL-ML           | A-4, A-6              | 0                     | 100                               | 95-100 | 90-100 | 70-95 | 25-40        | 4-18              |
|                               | 50-60     | Stratified silty clay loam to gravelly sandy loam. | CL, ML,<br>SM, SC          | A-2, A-4,<br>A-6      | 0                     | 60-100                            | 55-100 | 45-100 | 30-95 | 20-40        | 4-18              |
| MaB, MaC, MaD-----<br>Manor   | 0-10      | Silt loam-----                                     | ML                         | A-4, A-6              | 0                     | 95-100                            | 80-100 | 70-100 | 50-90 | 32-40        | 6-12              |
|                               | 10-23     | Loam, silt loam, channery loam.                    | SM, ML, GM                 | A-4, A-6              | 0-10                  | 70-95                             | 60-95  | 50-95  | 35-85 | 26-40        | 4-12              |
|                               | 23-60     | Loam, sandy loam, channery sandy loam.             | SM, ML,<br>CL-ML,<br>SM-SC | A-1, A-2,<br>A-4, A-6 | 0-5                   | 70-100                            | 60-100 | 35-95  | 20-75 | 20-40        | 2-12              |
| MbB, MbD, MbF-----<br>Manor   | 0-10      | Very stony silt loam.                              | ML, SM, GM                 | A-4, A-6              | 3-15                  | 70-100                            | 60-100 | 50-95  | 35-90 | 32-40        | 6-12              |
|                               | 10-23     | Loam, silt loam, channery loam.                    | SM, ML, GM                 | A-4, A-6              | 0-10                  | 70-95                             | 60-90  | 50-95  | 35-85 | 26-40        | 4-12              |
|                               | 23-60     | Loam, sandy loam, channery sandy loam.             | SM, ML,<br>CL-ML,<br>SM-SC | A-1, A-2,<br>A-4, A-6 | 0-5                   | 70-100                            | 60-100 | 35-95  | 20-75 | 20-40        | 2-12              |

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol     | Depth     | USDA texture                                                     | Classification       |                       | Frag-ments<br>> 3<br>inches | Percentage passing<br>sieve number-- |        |        |        | Liquid<br>limit | Plas-<br>ticity<br>index |
|------------------------------|-----------|------------------------------------------------------------------|----------------------|-----------------------|-----------------------------|--------------------------------------|--------|--------|--------|-----------------|--------------------------|
|                              |           |                                                                  | Unified              | AASHTO                |                             | 4                                    | 10     | 40     | 200    |                 |                          |
|                              | <u>In</u> |                                                                  |                      |                       | <u>Pct</u>                  |                                      |        |        |        | <u>Pct</u>      |                          |
| MdB-----<br>Mount Lucas      | 0-8       | Silt loam-----                                                   | ML                   | A-4                   | 0-5                         | 95-100                               | 80-100 | 75-95  | 60-90  | ---             | ---                      |
|                              | 8-30      | Silt loam,<br>gravelly silty<br>clay loam, sandy<br>clay loam.   | ML, GM, SM           | A-4, A-2,<br>A-7, A-5 | 0-10                        | 70-95                                | 55-95  | 45-95  | 30-90  | 30-45           | 3-15                     |
|                              | 30-60     | Gravelly clay<br>loam, gravelly<br>loam, gravelly<br>loamy sand. | SP-SM, SM,<br>ML, GM | A-2, A-4,<br>A-6, A-1 | 0-10                        | 45-80                                | 30-70  | 15-70  | 10-55  | 25-40           | NP-11                    |
| MeB-----<br>Mount Lucas      | 0-6       | Very stony silt<br>loam.                                         | ML, SM               | A-4                   | 3-10                        | 75-100                               | 55-75  | 50-70  | 35-55  | ---             | ---                      |
|                              | 6-30      | Silt loam,<br>gravelly silty<br>clay loam, sandy<br>clay loam.   | ML, GM, SM           | A-4, A-2,<br>A-7, A-5 | 0-10                        | 70-95                                | 55-95  | 45-95  | 30-90  | 30-45           | 3-15                     |
|                              | 30-60     | Gravelly clay<br>loam, gravelly<br>loam, gravelly<br>loamy sand. | SP-SM, SM,<br>ML, GM | A-2, A-4,<br>A-6, A-1 | 0-10                        | 45-80                                | 30-70  | 15-70  | 10-55  | 25-40           | NP-11                    |
| Nc, Nd-----<br>Newark        | 0-16      | Silt loam-----                                                   | ML, CL,<br>CL-ML     | A-4                   | 0                           | 95-100                               | 90-100 | 80-100 | 55-95  | <32             | NP-10                    |
|                              | 16-32     | Silt loam, silty<br>clay loam.                                   | ML, CL,<br>CL-ML     | A-4, A-6,<br>A-7      | 0                           | 95-100                               | 90-100 | 85-100 | 70-95  | 22-42           | 3-20                     |
|                              | 32-60     | Silt loam, silty<br>clay loam.                                   | ML, CL,<br>CL-ML     | A-4, A-6,<br>A-7      | 0-3                         | 75-100                               | 70-100 | 65-100 | 55-95  | 22-42           | 3-20                     |
| Ne-----<br>Nolin             | 0-10      | Silt loam-----                                                   | ML, CL,<br>CL-ML     | A-4, A-6              | 0                           | 100                                  | 95-100 | 90-100 | 80-100 | 25-40           | 5-18                     |
|                              | 10-60     | Silt loam, silty<br>clay loam.                                   | ML, CL,<br>CL-ML     | A-4, A-6,<br>A-7      | 0                           | 100                                  | 95-100 | 85-100 | 75-100 | 25-46           | 5-23                     |
| Pa-----<br>Penlaw            | 0-12      | Silt loam-----                                                   | CL, CL-ML            | A-4, A-6              | 0-10                        | 95-100                               | 85-100 | 75-100 | 60-100 | 10-40           | 5-25                     |
|                              | 12-29     | Silty clay loam,<br>silt loam.                                   | CL, CL-ML            | A-4, A-6              | 0-10                        | 95-100                               | 85-100 | 75-100 | 60-95  | 10-40           | 5-25                     |
|                              | 29-55     | Silty clay loam,<br>silt loam.                                   | CL, CH,<br>CL-ML     | A-4, A-6,<br>A-7      | 0-20                        | 65-100                               | 60-100 | 55-100 | 50-95  | 15-55           | 6-30                     |
|                              | 55-60     | Silty clay, clay,<br>loam.                                       | CL, GC,<br>SC, CH    | A-4, A-6,<br>A-7      | 0-20                        | 65-100                               | 60-100 | 55-100 | 40-95  | 15-55           | 6-30                     |
| PeC, PeD, PeE-----<br>Pequea | 0-10      | Silt loam-----                                                   | ML, SM               | A-4, A-2              | 0                           | 90-100                               | 90-100 | 65-95  | 35-85  | 20-30           | NP-6                     |
|                              | 10-26     | Silt loam,<br>channery loam,<br>channery sandy<br>loam.          | ML, SM, GM           | A-4, A-2              | 0-5                         | 70-95                                | 60-95  | 55-90  | 35-80  | 20-35           | NP-10                    |
|                              | 26-52     | Loam, channery<br>loam, channery<br>sandy loam.                  | SM, GM, ML           | A-4, A-2              | 0-10                        | 70-95                                | 55-90  | 50-90  | 35-70  | 20-35           | NP-10                    |
|                              | 52        | Unweathered<br>bedrock.                                          | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |
| Qu*.<br>Pits                 |           |                                                                  |                      |                       |                             |                                      |        |        |        |                 |                          |
| RaB-----<br>Readington       | 0-9       | Silt loam-----                                                   | ML                   | A-4                   | 0-5                         | 90-100                               | 80-100 | 80-100 | 65-100 | ---             | ---                      |
|                              | 9-33      | Loam, channery<br>silt loam, silty<br>clay loam.                 | ML, CL,<br>CL-ML     | A-4, A-6              | 0-10                        | 80-100                               | 70-100 | 65-100 | 55-95  | 25-39           | 5-12                     |
|                              | 33-58     | Silt loam, shaly<br>loam, shaly silt<br>loam.                    | ML, CL,<br>SM, GM    | A-2, A-4,<br>A-6      | 0-10                        | 60-95                                | 40-90  | 30-85  | 25-55  | 20-35           | NP-12                    |
|                              | 58        | Weathered bedrock                                                | ---                  | ---                   | ---                         | ---                                  | ---    | ---    | ---    | ---             | ---                      |

See footnote at end of table.



TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol     | Depth     | USDA texture                                             | Classification    |               | Frag-ments<br>> 3<br>inches<br>Pct | Percentage passing<br>sieve number-- |        |        |       | Liquid<br>limit<br>Pct | Plas-<br>ticity<br>index |
|------------------------------|-----------|----------------------------------------------------------|-------------------|---------------|------------------------------------|--------------------------------------|--------|--------|-------|------------------------|--------------------------|
|                              |           |                                                          | Unified           | AASHTO        |                                    | 4                                    | 10     | 40     | 200   |                        |                          |
| RbB-----<br>Readington       | <u>In</u> |                                                          |                   |               |                                    |                                      |        |        |       |                        |                          |
|                              | 0-9       | Extremely stony silt loam.                               | ML                | A-4           | 15-25                              | 80-95                                | 70-85  | 65-85  | 50-70 | ---                    | ---                      |
|                              | 9-33      | Loam, channery silt loam, silty clay loam.               | ML, CL, CL-ML     | A-4, A-6      | 0-10                               | 80-100                               | 70-100 | 65-100 | 55-95 | 25-39                  | 5-12                     |
|                              | 33-58     | Silt loam, shaly loam, shaly silt loam.                  | GM, GC, SM, SC    | A-2, A-4, A-6 | 0-10                               | 60-95                                | 40-90  | 30-85  | 25-55 | 20-35                  | NP-12                    |
|                              | 58        | Weathered bedrock                                        | ---               | ---           | ---                                | ---                                  | ---    | ---    | ---   | ---                    | ---                      |
| Rd-----<br>Rowland           | 0-9       | Silt loam-----                                           | ML, SM            | A-4           | 0-5                                | 95-100                               | 95-100 | 75-100 | 35-95 | ---                    | ---                      |
|                              | 9-25      | Silt loam, loam, sandy clay loam.                        | ML, SM            | A-4, A-7, A-6 | 0-5                                | 95-100                               | 95-100 | 75-100 | 35-95 | 24-45                  | NP-15                    |
|                              | 25-42     | Sandy clay, silt loam, gravelly silty clay loam.         | ML, SM            | A-4, A-6, A-7 | 0-10                               | 90-100                               | 70-100 | 65-100 | 35-95 | 25-50                  | 3-17                     |
|                              | 42-60     | Stratified sand to gravel.                               | SM, GM, GC, SC    | A-2, A-1      | 0-15                               | 55-80                                | 30-70  | 20-40  | 15-30 | ---                    | ---                      |
| UaB, UaC, UaD-----<br>Ungers | 0-10      | Loam-----                                                | ML, CL            | A-4           | 0-5                                | 90-100                               | 85-100 | 85-95  | 60-85 | ---                    | ---                      |
|                              | 10-46     | Loam, channery clay loam, very channery sandy clay loam. | GM, SM, ML        | A-2, A-4      | 0-10                               | 60-95                                | 40-90  | 30-70  | 25-55 | 25-35                  | 1-10                     |
|                              | 46-50     | Channery loam, very channery sandy loam.                 | GM, SM, GC, GM-GC | A-2, A-1      | 0-15                               | 55-85                                | 25-50  | 20-40  | 15-30 | 20-35                  | NP-11                    |
|                              | 50        | Unweathered bedrock.                                     | ---               | ---           | ---                                | ---                                  | ---    | ---    | ---   | ---                    | ---                      |
| UbB, UbD, UbE-----<br>Ungers | 0-10      | Extremely stony loam.                                    | SM, GM, ML, CL    | A-2, A-4      | 15-25                              | 60-95                                | 55-85  | 40-70  | 25-55 | ---                    | ---                      |
|                              | 10-46     | Loam, channery clay loam, very channery sandy clay loam. | GM, SM, ML        | A-2, A-4      | 0-25                               | 60-95                                | 40-90  | 30-70  | 25-55 | 25-35                  | 1-10                     |
|                              | 46-50     | Channery loam, very channery sandy loam.                 | GM, SM, GC, GM-GC | A-2, A-1      | 0-25                               | 55-85                                | 25-50  | 20-40  | 15-30 | 20-35                  | NP-11                    |
|                              | 50        | Unweathered bedrock.                                     | ---               | ---           | ---                                | ---                                  | ---    | ---    | ---   | ---                    | ---                      |
| Uc#.<br>Urban land           |           |                                                          |                   |               |                                    |                                      |        |        |       |                        |                          |
| Ud.<br>Udorthents            |           |                                                          |                   |               |                                    |                                      |        |        |       |                        |                          |

\* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

| Soil name and map symbol            | Depth                           | Clay                             | Moist bulk density                               | Permeability                               | Available water capacity                         | Soil reaction                            | Shrink-swell potential                                      | Erosion factors              |     | Organic matter |
|-------------------------------------|---------------------------------|----------------------------------|--------------------------------------------------|--------------------------------------------|--------------------------------------------------|------------------------------------------|-------------------------------------------------------------|------------------------------|-----|----------------|
|                                     |                                 |                                  |                                                  |                                            |                                                  |                                          |                                                             | K                            | T   |                |
|                                     | In                              | Pct.                             | G/cm <sup>3</sup>                                | In/hr                                      | In/in                                            | pH                                       |                                                             |                              |     | Pct            |
| AbB-----<br>Abbottstown             | 0-10<br>10-24<br>24-35<br>35-60 | 10-25<br>17-32<br>17-32<br>17-32 | 1.30-1.45<br>1.30-1.45<br>1.60-1.80<br>1.60-1.80 | 0.6-2.0<br>0.6-2.0<br>0.06-0.2<br>0.06-0.6 | 0.16-0.22<br>0.14-0.22<br>0.06-0.10<br>0.06-0.12 | 4.5-7.3<br>4.5-7.3<br>5.1-7.3<br>5.1-7.3 | Low-----<br>Low-----<br>Low-----<br>Low-----                | 0.43<br>0.43<br>0.28<br>0.28 | 3   | 2-3            |
| AsB-----<br>Abbottstown             | 0-10<br>10-24<br>24-35<br>35-60 | 10-25<br>17-32<br>17-32<br>17-32 | 1.35-1.55<br>1.30-1.45<br>1.60-1.80<br>1.60-1.80 | 0.6-2.0<br>0.6-2.0<br>0.06-0.2<br>0.06-0.6 | 0.14-0.20<br>0.14-0.22<br>0.06-0.10<br>0.06-0.12 | 4.5-7.3<br>4.5-7.3<br>5.1-7.3<br>5.1-7.3 | Low-----<br>Low-----<br>Low-----<br>Low-----                | 0.32<br>0.43<br>0.28<br>0.28 | 3   | ---            |
| Ba-----<br>Baile                    | 0-10<br>10-40<br>40-60          | 15-32<br>10-35<br>10-25          | 1.20-1.40<br>1.30-1.60<br>1.30-1.60              | 0.2-0.6<br>0.06-0.2<br>0.06-0.6            | 0.16-0.27<br>0.12-0.24<br>0.10-0.24              | 5.6-7.3<br>5.6-7.3<br>5.6-7.3            | Low-----<br>Moderate-----<br>Low-----                       | 0.43<br>0.43<br>0.43         | 3   | 1-4            |
| BdA, BdB, BdC-----<br>Bedington     | 0-9<br>9-60<br>60-77            | 15-25<br>18-32<br>18-32          | 1.20-1.50<br>1.30-1.60<br>1.40-1.60              | 0.6-2.0<br>0.6-2.0<br>0.6-2.0              | 0.14-0.18<br>0.12-0.14<br>0.08-0.12              | 4.5-7.3<br>4.5-7.3<br>4.5-7.3            | Low-----<br>Low-----<br>Low-----                            | 0.32<br>0.20<br>0.20         | 4   | 1-3            |
| BeD-----<br>Bedington               | 0-9<br>9-60<br>60-77            | 15-25<br>18-32<br>18-32          | 1.20-1.50<br>1.30-1.60<br>1.40-1.60              | 0.6-2.0<br>0.6-2.0<br>0.6-2.0              | 0.12-0.16<br>0.12-0.14<br>0.08-0.12              | 4.5-7.3<br>4.5-7.3<br>4.5-7.3            | Low-----<br>Low-----<br>Low-----                            | 0.28<br>0.20<br>0.20         | 4   | 1-3            |
| Bm-----<br>Blairton                 | 0-10<br>10-35<br>35-39<br>39    | 10-27<br>18-35<br>10-27<br>---   | 1.40-1.60<br>1.50-1.70<br>1.40-1.60<br>---       | 0.6-2.0<br>0.2-0.6<br>0.2-2.0<br>---       | 0.14-0.18<br>0.08-0.14<br>0.04-0.10<br>---       | 4.5-7.3<br>4.5-7.3<br>4.5-7.3<br>---     | Low-----<br>Low-----<br>Low-----<br>---                     | 0.43<br>0.32<br>0.32<br>---  | 3-2 | 1-4            |
| Bo-----<br>Bowmansville             | 0-7<br>7-35<br>35-52<br>52-66   | 10-17<br>15-30<br>15-30<br>0-10  | 1.20-1.40<br>1.30-1.50<br>1.20-1.50<br>1.20-1.70 | 0.6-2.0<br>0.2-0.6<br>0.2-2.0<br>2.0-6.0   | 0.16-0.20<br>0.16-0.20<br>0.12-0.18<br>0.04-0.08 | 5.1-7.3<br>5.1-7.3<br>5.1-7.3<br>5.1-7.3 | Low-----<br>Low-----<br>Low-----<br>Low-----                | 0.32<br>0.28<br>0.28<br>0.17 | 4   | 1-2            |
| BrB, BrC-----<br>Brecknock          | 0-8<br>8-38<br>38-56<br>56      | 10-20<br>17-32<br>17-32<br>---   | 1.20-1.30<br>1.30-1.50<br>1.30-1.50<br>---       | 0.6-2.0<br>0.6-2.0<br>0.6-2.0<br>---       | 0.10-0.16<br>0.08-0.14<br>0.03-0.10<br>---       | 4.5-6.0<br>4.5-6.0<br>4.5-6.0<br>---     | Low-----<br>Low-----<br>Low-----<br>---                     | 0.24<br>0.24<br>0.24<br>---  | 3   | 1-2            |
| BsB, BsC-----<br>Brecknock          | 0-8<br>8-38<br>38-56<br>56      | 10-20<br>17-32<br>17-32<br>---   | 1.20-1.30<br>1.30-1.50<br>1.30-1.50<br>---       | 0.6-2.0<br>0.6-2.0<br>0.6-2.0<br>---       | 0.10-0.18<br>0.08-0.14<br>0.03-0.10<br>---       | 4.5-6.0<br>4.5-6.0<br>4.5-6.0<br>---     | Low-----<br>Low-----<br>Low-----<br>---                     | 0.24<br>0.24<br>0.24<br>---  | 3   | 1-2            |
| BuA, BuB, BuC,<br>BuD-----<br>Bucks | 0-6<br>6-30<br>30-52<br>52      | 10-25<br>18-30<br>10-20<br>---   | 1.20-1.60<br>1.40-1.70<br>1.30-1.60<br>---       | 0.2-2.0<br>0.2-2.0<br>0.2-2.0<br>---       | 0.16-0.28<br>0.11-0.28<br>0.04-0.16<br>---       | 5.1-6.0<br>5.1-6.0<br>5.1-6.0<br>---     | Low-----<br>Moderate-----<br>Low-----<br>---                | 0.32<br>0.37<br>0.32<br>---  | 4   | 5-3            |
| BxC-----<br>Bucks                   | 0-6<br>6-30<br>30-52<br>52      | 10-25<br>18-30<br>10-20<br>---   | 0.75-1.60<br>1.40-1.70<br>1.30-1.60<br>---       | 0.2-2.0<br>0.2-2.0<br>0.2-2.0<br>---       | 0.16-0.28<br>0.11-0.28<br>0.04-0.16<br>---       | 4.5-5.5<br>4.5-5.5<br>4.5-5.5<br>---     | Low-----<br>Moderate-----<br>Low-----<br>---                | 0.28<br>0.37<br>0.32<br>---  | 4   | ---            |
| CbA, CbB, CbC-----<br>Chester       | 0-10<br>10-43<br>43-60          | 10-23<br>18-35<br>10-24          | 1.10-1.30<br>1.20-1.50<br>1.40-1.60              | 0.6-2.0<br>0.6-2.0<br>0.6-2.0              | 0.12-0.16<br>0.10-0.14<br>0.08-0.12              | 5.1-7.3<br>5.1-7.3<br>5.1-7.3            | Low-----<br>Low-----<br>Low-----                            | 0.32<br>0.43<br>0.49         | 4   | 1-3            |
| CkA-----<br>Clarksburg              | 0-9<br>9-22<br>22-52<br>52-60   | 10-27<br>22-35<br>22-35<br>22-40 | 1.20-1.40<br>1.30-1.50<br>1.40-1.70<br>1.20-1.60 | 0.6-2.0<br>0.6-2.0<br>0.06-0.6<br>0.06-0.6 | 0.14-0.20<br>0.12-0.18<br>0.06-0.12<br>0.06-0.16 | 5.6-7.8<br>5.6-7.8<br>5.6-7.8<br>5.6-7.8 | Low-----<br>Moderate-----<br>Moderate-----<br>Moderate----- | 0.37<br>0.28<br>0.28<br>0.28 | 3-2 | 1-3            |



TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay  | Moist bulk density | Permeability | Available water capacity | Soil reaction | Shrink-swell potential | Erosion factors |   | Organic matter |
|--------------------------|-------|-------|--------------------|--------------|--------------------------|---------------|------------------------|-----------------|---|----------------|
|                          |       |       |                    |              |                          |               |                        | K               | T |                |
|                          | In    | Pct   | G/cm <sup>3</sup>  | In/hr        | In/in                    | pH            |                        |                 |   | Pct            |
| C1B, C1D, C1F----        | 0-7   | 15-27 | 1.20-1.40          | 0.6-2.0      | 0.10-0.16                | 3.6-5.5       | Low-----               | 0.17            | 3 | ---            |
| Clymer                   | 7-27  | 18-30 | 1.20-1.50          | 0.6-2.0      | 0.08-0.14                | 3.6-5.5       | Low-----               | 0.15            |   |                |
|                          | 27-60 | 15-27 | 1.20-1.40          | 0.6-2.0      | 0.04-0.08                | 3.6-5.5       | Low-----               | 0.15            |   |                |
| Cm-----                  | 0-39  | 5-18  | 1.20-1.40          | 0.6-2.0      | 0.13-0.21                | 5.1-6.5       | Low-----               | 0.43            | 3 | 1-3            |
| Comus                    | 39-60 | 5-34  | 1.30-1.60          | 0.6-6.0      | 0.07-0.21                | 5.1-6.5       | Low-----               | 0.28            |   |                |
| CnA, CnB, CnC----        | 0-10  | 15-25 | 1.20-1.40          | 0.6-2.0      | 0.16-0.20                | 5.1-7.8       | Low-----               | 0.32            | 4 | 1-3            |
| Conestoga                | 10-38 | 22-35 | 1.40-1.60          | 0.6-2.0      | 0.12-0.16                | 5.1-7.8       | Low-----               | 0.24            |   |                |
|                          | 38-75 | 22-35 | 1.40-1.60          | 0.6-2.0      | 0.06-0.10                | 5.1-7.8       | Low-----               | 0.24            |   |                |
| DbA, DbB-----            | 0-10  | 15-30 | 1.10-1.40          | 0.6-2.0      | 0.16-0.22                | 5.6-7.3       | Low-----               | 0.32            | 4 | 1-2            |
| Duffield                 | 10-45 | 20-42 | 1.30-1.60          | 0.6-2.0      | 0.14-0.20                | 5.6-7.3       | Moderate----           | 0.28            |   |                |
|                          | 45-60 | 18-41 | 1.30-1.60          | 0.6-2.0      | 0.14-0.20                | 5.6-7.3       | Moderate----           | 0.28            |   |                |
| EcA, EcB, EcC----        | 0-10  | 10-27 | 1.20-1.40          | 0.6-2.0      | 0.19-0.23                | 5.1-7.3       | Low-----               | 0.37            | 5 | .5-3           |
| Elk                      | 10-48 | 18-34 | 1.20-1.50          | 0.6-2.0      | 0.18-0.22                | 5.1-7.3       | Low-----               | 0.28            |   |                |
|                          | 48-62 | 15-40 | 1.20-1.50          | 0.6-2.0      | 0.14-0.20                | 5.1-7.3       | Low-----               | 0.28            |   |                |
| Eu*:                     |       |       |                    |              |                          |               |                        |                 |   |                |
| Elk-----                 | 0-10  | 10-27 | 1.20-1.40          | 0.6-2.0      | 0.19-0.23                | 5.1-7.3       | Low-----               | 0.37            | 5 | .5-3           |
|                          | 10-48 | 18-34 | 1.20-1.50          | 0.6-2.0      | 0.18-0.22                | 5.1-7.3       | Low-----               | 0.28            |   |                |
|                          | 48-62 | 15-40 | 1.20-1.50          | 0.6-2.0      | 0.14-0.20                | 5.1-7.3       | Low-----               | 0.28            |   |                |
| Urban land.              |       |       |                    |              |                          |               |                        |                 |   |                |
| Ff*:                     |       |       |                    |              |                          |               |                        |                 |   |                |
| Fluvaquents.             |       |       |                    |              |                          |               |                        |                 |   |                |
| Udifluvents.             |       |       |                    |              |                          |               |                        |                 |   |                |
| GbB, GbC, GbD----        | 0-8   | 15-25 | 1.20-1.40          | 0.6-2.0      | 0.14-0.24                | 4.5-7.3       | Low-----               | 0.32            | 3 | 1-3            |
| Glenelg                  | 8-22  | 20-32 | 1.40-1.60          | 0.6-2.0      | 0.10-0.20                | 4.5-7.3       | Low-----               | 0.43            |   |                |
|                          | 22-60 | 5-20  | 1.40-1.60          | 0.6-2.0      | 0.10-0.19                | 4.5-7.3       | Low-----               | 0.49            |   |                |
| GdB-----                 | 0-9   | 10-20 | 1.20-1.40          | 0.6-2.0      | 0.16-0.20                | 5.1-7.3       | Low-----               | 0.32            | 3 | 1-3            |
| Glenville                | 9-15  | 20-35 | 1.40-1.60          | 0.6-2.0      | 0.12-0.16                | 5.1-7.3       | Low-----               | 0.24            |   |                |
|                          | 15-38 | 20-35 | 1.60-1.80          | 0.06-0.6     | 0.08-0.12                | 5.1-7.3       | Low-----               | 0.24            |   |                |
|                          | 38-62 | 5-25  | 1.40-1.60          | 0.2-0.6      | 0.06-0.12                | 5.1-7.3       | Low-----               | 0.24            |   |                |
| HaA, HaB, HbC,           |       |       |                    |              |                          |               |                        |                 |   |                |
| HbD-----                 | 0-10  | 15-35 | 1.20-1.40          | 0.6-6.0      | 0.16-0.24                | 4.5-7.3       | Low-----               | 0.32            | 4 | 1-5            |
| Hagerstown               | 10-20 | 23-60 | 1.20-1.60          | 0.6-2.0      | 0.10-0.24                | 4.5-7.3       | Moderate----           | 0.28            |   |                |
|                          | 20-60 | 23-60 | 1.20-1.60          | 0.6-2.0      | 0.10-0.24                | 6.1-7.8       | Moderate----           | 0.28            |   |                |
| Hc*:                     |       |       |                    |              |                          |               |                        |                 |   |                |
| Hagerstown-----          | 0-10  | 15-35 | 1.20-1.40          | 0.6-6.0      | 0.16-0.24                | 4.5-7.3       | Low-----               | 0.32            | 4 | 1-5            |
|                          | 10-20 | 23-60 | 1.20-1.60          | 0.6-2.0      | 0.10-0.24                | 4.5-7.3       | Moderate----           | 0.28            |   |                |
|                          | 20-60 | 23-60 | 1.20-1.60          | 0.6-2.0      | 0.10-0.24                | 6.1-7.8       | Moderate----           | 0.28            |   |                |
| Urban land.              |       |       |                    |              |                          |               |                        |                 |   |                |
| HfA, HfB, HfC,           |       |       |                    |              |                          |               |                        |                 |   |                |
| HfD-----                 | 0-8   | 10-20 | 1.20-1.40          | 0.6-2.0      | 0.16-0.20                | 5.6-7.3       | Low-----               | 0.32            | 3 | 1-3            |
| Hollinger                | 8-30  | 18-25 | 1.40-1.60          | 0.6-2.0      | 0.10-0.16                | 5.6-7.3       | Low-----               | 0.28            |   |                |
|                          | 30-60 | 8-20  | 1.40-1.60          | 0.6-2.0      | 0.06-0.12                | 6.1-7.8       | Low-----               | 0.17            |   |                |
| Hg-----                  | 0-8   | 15-27 | 1.20-1.40          | 0.6-2.0      | 0.20-0.24                | 5.6-7.3       | Low-----               | 0.28            | 5 | 2-5            |
| Holly                    | 8-27  | 18-30 | 1.20-1.50          | 0.2-2.0      | 0.17-0.21                | 5.6-7.3       | Low-----               | 0.28            |   |                |
|                          | 27-60 | 10-27 | 1.20-1.45          | 0.6-6.0      | 0.10-0.20                | 5.6-7.3       | Low-----               | 0.28            |   |                |
|                          | 43-60 | 10-27 | 1.20-1.40          | 0.6-6.0      | 0.07-0.18                | 5.6-7.3       | Low-----               | 0.28            |   |                |
| LaB, LaC, LaD----        | 0-8   | 10-15 | 1.25-1.35          | 0.6-2.0      | 0.15-0.24                | 4.5-7.3       | Low-----               | 0.28            | 4 | 1-2            |
| Lansdale                 | 8-34  | 10-18 | 1.35-1.45          | 0.6-6.0      | 0.10-0.15                | 4.5-7.3       | Low-----               | 0.20            |   |                |
|                          | 34-46 | 10-18 | 1.35-1.45          | 2.0-6.0      | 0.07-0.10                | 4.5-7.3       | Low-----               | 0.17            |   |                |
|                          | 46    | ---   | ---                | ---          | ---                      | ---           | ---                    | ---             |   |                |

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and<br>map symbol | Depth | Clay  | Moist<br>bulk<br>density | Permeability | Available<br>water<br>capacity | Soil<br>reaction | Shrink-swell<br>potential | Erosion<br>factors |   | Organic<br>matter |
|-----------------------------|-------|-------|--------------------------|--------------|--------------------------------|------------------|---------------------------|--------------------|---|-------------------|
|                             |       |       |                          |              |                                |                  |                           | K                  | T |                   |
|                             | In    | Pct   | G/cm <sup>3</sup>        | In/hr        | In/in                          | pH               |                           |                    |   | Pct               |
| LdA, LdB, LdC----<br>Letort | 0-9   | 15-25 | 1.20-1.40                | 0.6-2.0      | 0.16-0.20                      | 5.1-7.8          | Low-----                  | 0.32               | 4 | 1-3               |
|                             | 9-32  | 18-35 | 1.40-1.60                | 0.6-2.0      | 0.12-0.16                      | 5.1-7.8          | Low-----                  | 0.28               |   |                   |
|                             | 32-62 | 18-35 | 1.40-1.60                | 0.6-2.0      | 0.08-0.12                      | 5.6-7.8          | Low-----                  | 0.17               |   |                   |
| Lg-----<br>Linden           | 0-10  | 10-18 | 1.20-1.40                | 2.0-6.0      | 0.14-0.18                      | 5.6-7.3          | Low-----                  | 0.37               | 4 | 1-4               |
|                             | 10-50 | 10-18 | 1.20-1.40                | 2.0-6.0      | 0.14-0.18                      | 5.6-7.3          | Low-----                  | 0.37               |   |                   |
|                             | 50-60 | 5-25  | 1.20-1.40                | 6.0-20       | 0.05-0.08                      | 5.6-7.3          | Low-----                  | 0.17               |   |                   |
| Ln-----<br>Lindside         | 0-10  | 15-27 | 1.20-1.40                | 0.6-2.0      | 0.20-0.26                      | 5.1-7.3          | Low-----                  | 0.32               | 5 | 2-4               |
|                             | 10-50 | 18-35 | 1.20-1.40                | 0.2-2.0      | 0.17-0.22                      | 5.1-7.3          | Low-----                  | 0.37               |   |                   |
|                             | 50-60 | 18-35 | 1.20-1.40                | 0.2-6.0      | 0.12-0.18                      | 5.6-7.3          | Low-----                  | 0.32               |   |                   |
| MaB, MaC, MaD----<br>Manor  | 0-10  | 10-25 | 1.20-1.40                | 0.6-2.0      | 0.17-0.21                      | 4.5-7.3          | Low-----                  | 0.37               | 3 | 1-3               |
|                             | 10-23 | 10-25 | 1.30-1.50                | 0.6-2.0      | 0.14-0.20                      | 4.5-7.3          | Low-----                  | 0.32               |   |                   |
|                             | 23-60 | 5-20  | 1.25-1.50                | 0.6-6.0      | 0.10-0.17                      | 4.5-7.3          | Low-----                  | 0.49               |   |                   |
| MbB, MbD, MbF----<br>Manor  | 0-10  | 10-25 | 1.20-1.45                | 0.6-2.0      | 0.14-0.17                      | 4.5-7.3          | Low-----                  | 0.32               | 3 | ---               |
|                             | 10-23 | 10-25 | 1.30-1.50                | 0.6-2.0      | 0.14-0.20                      | 4.5-7.3          | Low-----                  | 0.32               |   |                   |
|                             | 23-60 | 5-20  | 1.25-1.50                | 0.6-6.0      | 0.10-0.17                      | 4.5-7.3          | Low-----                  | 0.49               |   |                   |
| MdB-----<br>Mount Lucas     | 0-8   | 10-20 | 1.20-1.30                | 0.6-2.0      | 0.18-0.22                      | 5.1-7.3          | Low-----                  | 0.37               | 4 | 1-2               |
|                             | 8-30  | 17-32 | 1.30-1.60                | 0.06-0.6     | 0.12-0.16                      | 5.1-7.3          | Low-----                  | 0.28               |   |                   |
|                             | 30-60 | 5-20  | 1.30-1.70                | 0.06-6.0     | 0.04-0.12                      | 5.6-7.3          | Low-----                  | 0.28               |   |                   |
| MeB-----<br>Mount Lucas     | 0-6   | 10-20 | 1.20-1.30                | 0.6-2.0      | 0.16-0.22                      | 5.1-7.3          | Low-----                  | 0.28               | 3 | ---               |
|                             | 6-30  | 17-32 | 1.30-1.60                | 0.06-0.6     | 0.12-0.16                      | 5.1-7.3          | Low-----                  | 0.28               |   |                   |
|                             | 30-60 | 5-32  | 1.30-1.70                | 0.06-6.0     | 0.04-0.12                      | 5.6-7.3          | Low-----                  | 0.28               |   |                   |
| Nc, Nd-----<br>Newark       | 0-16  | 7-27  | 1.20-1.40                | 0.6-2.0      | 0.15-0.23                      | 5.6-7.8          | Low-----                  | 0.43               | 5 | 1-4               |
|                             | 16-32 | 18-35 | 1.20-1.45                | 0.6-2.0      | 0.18-0.23                      | 5.6-7.8          | Low-----                  | 0.43               |   |                   |
|                             | 32-60 | 12-40 | 1.30-1.50                | 0.6-2.0      | 0.15-0.22                      | 5.6-7.8          | Low-----                  | 0.43               |   |                   |
| Ne-----<br>Nolin            | 0-10  | 12-35 | 1.20-1.40                | 0.6-2.0      | 0.18-0.23                      | 5.6-8.4          | Low-----                  | 0.43               | 5 | 2-4               |
|                             | 10-60 | 18-35 | 1.25-1.50                | 0.6-2.0      | 0.18-0.23                      | 5.6-8.4          | Low-----                  | 0.43               |   |                   |
| Pa-----<br>Penlaw           | 0-12  | 15-25 | 1.20-1.40                | 0.6-2.0      | 0.16-0.20                      | 5.6-7.3          | Low-----                  | 0.43               | 3 | 2-4               |
|                             | 12-29 | 20-35 | 1.40-1.60                | 0.6-2.0      | 0.16-0.20                      | 5.6-7.3          | Moderate----              | 0.24               |   |                   |
|                             | 29-55 | 20-35 | 1.60-1.80                | 0.06-0.2     | 0.10-0.16                      | 5.6-7.3          | Moderate----              | 0.24               |   |                   |
|                             | 55-60 | 15-50 | 1.40-1.60                | 0.06-0.6     | 0.12-0.16                      | 5.6-7.3          | Moderate----              | 0.24               |   |                   |
| PeC, PeD, PeE----<br>Pequea | 0-10  | 10-20 | 1.10-1.40                | 0.6-6.0      | 0.12-0.18                      | 6.1-7.3          | Low-----                  | 0.43               | 3 | 1-3               |
|                             | 10-26 | 10-20 | 1.20-1.50                | 0.6-6.0      | 0.10-0.14                      | 6.1-7.3          | Low-----                  | 0.28               |   |                   |
|                             | 26-52 | 10-20 | 1.20-1.50                | 0.6-6.0      | 0.06-0.12                      | 7.4-8.4          | Low-----                  | 0.28               |   |                   |
|                             | 52    | ---   | ---                      | ---          | ---                            | ---              | ---                       | ---                |   |                   |
| Qu*.<br>Pits                |       |       |                          |              |                                |                  |                           |                    |   |                   |
| RaB-----<br>Readington      | 0-9   | 15-20 | 1.20-1.40                | 0.6-2.0      | 0.16-0.20                      | 4.5-6.5          | Low-----                  | 0.43               | 3 | 1-3               |
|                             | 9-33  | 18-35 | 1.40-1.60                | 0.6-2.0      | 0.08-0.14                      | 4.5-6.5          | Low-----                  | 0.32               |   |                   |
|                             | 33-58 | 20-30 | 1.60-1.80                | 0.2-0.6      | 0.06-0.10                      | 4.5-6.5          | Low-----                  | 0.32               |   |                   |
|                             | 58    | ---   | ---                      | ---          | ---                            | ---              | ---                       | ---                |   |                   |
| RbB-----<br>Readington      | 0-9   | 15-20 | 1.20-1.40                | 0.6-2.0      | 0.14-0.18                      | 4.5-6.5          | Low-----                  | 0.28               | 3 | 1-3               |
|                             | 9-33  | 18-35 | 1.40-1.60                | 0.6-2.0      | 0.08-0.14                      | 4.5-6.5          | Low-----                  | 0.32               |   |                   |
|                             | 33-58 | 20-30 | 1.60-1.80                | 0.2-0.6      | 0.06-0.10                      | 5.1-6.5          | Low-----                  | 0.32               |   |                   |
|                             | 58    | ---   | ---                      | ---          | ---                            | ---              | ---                       | ---                |   |                   |
| Rd-----<br>Rowland          | 0-9   | 10-20 | 1.10-1.30                | 0.2-2.0      | 0.14-0.18                      | 5.1-7.3          | Low-----                  | 0.43               | 4 | 2-4               |
|                             | 9-25  | 15-32 | 1.20-1.50                | 0.2-2.0      | 0.14-0.18                      | 5.1-7.3          | Low-----                  | 0.28               |   |                   |
|                             | 25-42 | 15-32 | 1.20-1.50                | 0.2-2.0      | 0.12-0.16                      | 5.1-7.3          | Low-----                  | 0.28               |   |                   |
|                             | 42-60 | 3-12  | 1.40-1.70                | 2.0-6.0      | 0.03-0.08                      | 5.1-7.3          | Low-----                  | 0.17               |   |                   |
| UaB, UaC, UaD----<br>Ungers | 0-10  | 10-20 | 1.20-1.40                | 0.6-2.0      | 0.10-0.18                      | 3.6-7.3          | Low-----                  | 0.32               | 3 | 1-2               |
|                             | 10-46 | 17-27 | 1.30-1.50                | 0.6-2.0      | 0.10-0.14                      | 3.6-7.3          | Low-----                  | 0.17               |   |                   |
|                             | 46-50 | 10-20 | 1.30-1.50                | 0.6-2.0      | 0.06-0.12                      | 3.6-7.3          | Low-----                  | 0.17               |   |                   |
|                             | 50    | ---   | ---                      | ---          | ---                            | ---              | ---                       | ---                |   |                   |

See footnote at end of table.



TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and<br>map symbol | Depth     | Clay       | Moist<br>bulk<br>density | Permeability | Available<br>water<br>capacity | Soil<br>reaction | Shrink-swell<br>potential | Erosion<br>factors |   | Organic<br>matter |
|-----------------------------|-----------|------------|--------------------------|--------------|--------------------------------|------------------|---------------------------|--------------------|---|-------------------|
|                             |           |            |                          |              |                                |                  |                           | K                  | T |                   |
|                             | <u>In</u> | <u>Pct</u> | <u>G/cm<sup>3</sup></u>  | <u>In/hr</u> | <u>In/in</u>                   | <u>pH</u>        |                           |                    |   | <u>Pct</u>        |
| UbB, UbD, UbE----           | 0-10      | 10-20      | 1.20-1.40                | 0.6-2.0      | 0.10-0.16                      | 3.6-7.3          | Low-----                  | 0.17               | 3 | 1-2               |
| Ungers                      | 10-46     | 17-27      | 1.30-1.50                | 0.6-2.0      | 0.10-0.14                      | 3.6-7.3          | Low-----                  | 0.17               |   |                   |
|                             | 46-50     | 10-20      | 1.30-1.50                | 0.6-2.0      | 0.06-0.12                      | 3.6-7.3          | Low-----                  | 0.17               |   |                   |
|                             | 50        | ---        | ---                      | ---          | ---                            | ---              | -----                     | ---                |   |                   |
| Uc*.<br>Urban land          |           |            |                          |              |                                |                  |                           |                    |   |                   |
| Ud.<br>Udorthents           |           |            |                          |              |                                |                  |                           |                    |   |                   |

\* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

| Soil name and map symbol                | Hydro-logic group | Flooding     |            |         | High water table |          |         | Bedrock     |          | Potential frost action | Risk of corrosion |           |
|-----------------------------------------|-------------------|--------------|------------|---------|------------------|----------|---------|-------------|----------|------------------------|-------------------|-----------|
|                                         |                   | Frequency    | Duration   | Months  | Depth<br>Ft      | Kind     | Months  | Depth<br>In | Hardness |                        | Uncoated steel    | Concrete  |
| AbB, AsB-----<br>Abbottstown            | C                 | None-----    | ---        | ---     | 0.5-1.5          | Perched  | Nov-Mar | >40         | Soft     | High----               | High----          | Moderate. |
| Ba-----<br>Baile                        | D                 | None-----    | ---        | ---     | 0-0.5            | Apparent | Nov-Apr | >60         | ---      | High----               | High----          | High.     |
| BdA, BdB, BdC,<br>BeD-----<br>Bedington | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >40         | Soft     | Moderate               | Low-----          | High.     |
| Bm-----<br>Blairton                     | C                 | None-----    | ---        | ---     | 0.5-3.0          | Perched  | Nov-Mar | 20-40       | Soft     | High----               | High----          | High.     |
| Bo-----<br>Bowmansville                 | B/D               | Frequent---- | Brief----- | Nov-Jun | 0-1.5            | Apparent | Sep-May | >60         | ---      | High----               | High----          | Moderate. |
| BrB, BrC, BsB,<br>BsC-----<br>Brecknock | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | 40-60       | Hard     | Moderate               | Low-----          | Moderate. |
| BuA, BuB, BuC,<br>BuD-----<br>Bucks     | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >40         | Soft     | Moderate               | Low-----          | Moderate. |
| BxC-----<br>Bucks                       | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >40         | Soft     | Moderate               | Low-----          | Moderate. |
| CbA, CbB, CbC-----<br>Chester           | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >60         | ---      | Moderate               | Low-----          | High.     |
| CkA-----<br>Clarksburg                  | C                 | None-----    | ---        | ---     | 1.5-3.0          | Perched  | Nov-Mar | >60         | ---      | Moderate               | Moderate          | Moderate. |
| ClB, ClD, ClF-----<br>Clymer            | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >40         | Hard     | Moderate               | Low-----          | High.     |
| Cm-----<br>Comus                        | B                 | Occasional   | Very brief | Feb-May | >6.0             | ---      | ---     | >60         | ---      | Moderate               | Low-----          | High.     |
| CnA, CnB, CnC-----<br>Conestoga         | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >60         | ---      | Moderate               | Moderate          | High.     |
| DbA, DbB-----<br>Duffield               | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >48         | Hard     | Moderate               | Moderate          | Moderate. |
| EcA, EcB, EcC-----<br>Elk               | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >60         | ---      | ---                    | Moderate          | Moderate. |
| Eu*:<br>Elk-----                        | B                 | None-----    | ---        | ---     | >6.0             | ---      | ---     | >60         | ---      | ---                    | Moderate          | Moderate. |

See footnote at end of table.



TABLE 17.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol                      | Hydro-logic group | Flooding      |                         |         | High water table   |          |         | Bedrock            |          | Potential frost action | Risk of corrosion |           |
|-----------------------------------------------|-------------------|---------------|-------------------------|---------|--------------------|----------|---------|--------------------|----------|------------------------|-------------------|-----------|
|                                               |                   | Frequency     | Duration                | Months  | Depth<br><u>Ft</u> | Kind     | Months  | Depth<br><u>In</u> | Hardness |                        | Uncoated steel    | Concrete  |
| Eu*:<br>Urban land.                           |                   |               |                         |         |                    |          |         |                    |          |                        |                   |           |
| Ff*:<br>Fluvaquents.                          |                   |               |                         |         |                    |          |         |                    |          |                        |                   |           |
| Udifluvents.                                  |                   |               |                         |         |                    |          |         |                    |          |                        |                   |           |
| GbB, GbC, GbD-----<br>Glenelg                 | B                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >48                | Soft     | Moderate               | Low-----          | High.     |
| GdB-----<br>Glenville                         | C                 | None-----     | ---                     | ---     | 0.5-3.0            | Perched  | Nov-Apr | >60                | ---      | High-----              | High-----         | Moderate. |
| HaA, HaB, HbC,<br>HbD-----<br>Hagerstown      | C                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >40                | Hard     | Moderate               | Moderate          | Low.      |
| Hc*:<br>Hagerstown-----<br>Urban land.        | C                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >40                | Hard     | Moderate               | Moderate          | Low.      |
| HfA, HfB, HfC,<br>HfD-----<br>Hollinger       | B                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >60                | ---      | Moderate               | Low-----          | Moderate. |
| Hg-----<br>Holly                              | B/D               | Frequent----- | Long-----               | Nov-May | 0-0.5              | Apparent | Dec-May | >60                | ---      | High-----              | High-----         | Moderate. |
| LaB, LaC, LaD-----<br>Lansdale                | B                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | 40-60              | Soft     | Moderate               | Low-----          | High.     |
| LbB, LbC-----<br>Lehigh                       | C                 | None-----     | ---                     | ---     | 0.5-1.5            | Perched  | Nov-Mar | 40-60              | Hard     | High-----              | Moderate          | Moderate. |
| LdA, LdB, LdC-----<br>Letort                  | B                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >60                | ---      | Moderate               | Moderate          | Moderate. |
| Lg-----<br>Linden                             | B                 | Occasional    | Very brief<br>to brief. | Jan-Apr | 3.0-6.0            | Apparent | Nov-Mar | >60                | ---      | Moderate               | Low-----          | High.     |
| Ln-----<br>Lindside                           | C                 | Occasional    | Very brief              | Dec-Apr | 1.5-3.0            | Apparent | Dec-Apr | >60                | ---      | High-----              | Moderate          | Low.      |
| MaB, MaC, MaD,<br>MbB, MbD, MbF-----<br>Manor | B                 | None-----     | ---                     | ---     | >6.0               | ---      | ---     | >60                | ---      | Moderate               | Low-----          | Moderate. |
| MdB, MeB-----<br>Mount Lucas                  | C                 | None-----     | ---                     | ---     | 0.5-2.0            | Perched  | Nov-Mar | >60                | ---      | High-----              | High-----         | Moderate. |
| Nc, Nd-----<br>Newark                         | C                 | Occasional    | Brief-----              | Jan-Apr | 0.5-1.5            | Apparent | Dec-May | >60                | ---      | High-----              | High-----         | Low.      |

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol                       | Hydro-logic group | Flooding   |                |         | High water table   |          |         | Bedrock            |          | Potential frost action | Risk of corrosion |           |
|------------------------------------------------|-------------------|------------|----------------|---------|--------------------|----------|---------|--------------------|----------|------------------------|-------------------|-----------|
|                                                |                   | Frequency  | Duration       | Months  | Depth<br><u>Ft</u> | Kind     | Months  | Depth<br><u>In</u> | Hardness |                        | Uncoated steel    | Concrete  |
| Ne-----<br>Nolin                               | B                 | Occasional | Brief to long. | Feb-May | 3.0-6.0            | Apparent | Feb-Mar | >60                | ---      | ---                    | Low-----          | Moderate. |
| Pa-----<br>Penlaw                              | C                 | None-----  | ---            | ---     | 0.5-1.5            | Perched  | Nov-Mar | >60                | ---      | High-----              | High-----         | Moderate. |
| PeC, PeD, PeE-----<br>Pequea                   | B                 | None-----  | ---            | ---     | >6.0               | ---      | ---     | 40-60              | Hard     | Moderate               | Low-----          | Low.      |
| Qu*.<br>Pits                                   |                   |            |                |         |                    |          |         |                    |          |                        |                   |           |
| RaB, RbB-----<br>Readington                    | C                 | None-----  | ---            | ---     | 1.5-3.0            | Perched  | Nov-Mar | 40-60              | Soft     | Moderate               | Moderate          | Moderate. |
| Rd-----<br>Rowland                             | C                 | Occasional | Brief-----     | Nov-Mar | 1.0-3.0            | Apparent | Nov-May | >60                | ---      | High-----              | High-----         | Moderate. |
| UaB, UaC, UaD,<br>UbB, UbD, UbE-----<br>Ungers | B                 | None-----  | ---            | ---     | >6.0               | ---      | ---     | >40                | Soft     | Moderate               | Low-----          | High.     |
| Uc*.<br>Urban land                             |                   |            |                |         |                    |          |         |                    |          |                        |                   |           |
| Ud.<br>Udorthents                              |                   |            |                |         |                    |          |         |                    |          |                        |                   |           |

\* See description of the map unit for composition and behavior characteristics of the map unit.



TABLE 18.--CLASSIFICATION OF THE SOILS

| Soil name         | Family or higher taxonomic class                        |
|-------------------|---------------------------------------------------------|
| Abbottstown-----  | Fine-loamy, mixed, mesic Aeric Fragiaqualfs             |
| Baile-----        | Fine-loamy, mixed, mesic Typic Ochraqualts              |
| Bedington-----    | Fine-loamy, mixed, mesic Typic Hapludults               |
| Blairton-----     | Fine-loamy, mixed, mesic Aquic Hapludults               |
| Bowmansville----- | Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents     |
| Brecknock-----    | Fine-loamy, mixed, mesic Ultic Hapludalfs               |
| Bucks-----        | Fine-loamy, mixed, mesic Typic Hapludults               |
| Chester-----      | Fine-loamy, mixed, mesic Typic Hapludults               |
| Clarksburg-----   | Fine-loamy, mixed, mesic Typic Fragiudalfs              |
| Clymer-----       | Fine-loamy, mixed, mesic Typic Hapludults               |
| Comus-----        | Coarse-loamy, mixed, mesic Fluventic Dystrochrepts      |
| Conestoga-----    | Fine-loamy, mixed, mesic Typic Hapludalfs               |
| Duffield-----     | Fine-loamy, mixed, mesic Ultic Hapludalfs               |
| Elk-----          | Fine-silty, mixed, mesic Ultic Hapludalfs               |
| Fluvaquents-----  | Fluvaquents                                             |
| Glenelg-----      | Fine-loamy, mixed, mesic Typic Hapludults               |
| Glenville-----    | Fine-loamy, mixed, mesic Aquic Fragiudults              |
| Hagerstown-----   | Fine, mixed, mesic Typic Hapludalfs                     |
| Hollinger-----    | Fine-loamy, mixed, mesic Typic Hapludalfs               |
| Holly-----        | Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents     |
| Lansdale-----     | Coarse-loamy, mixed, mesic Typic Hapludults             |
| Lehigh-----       | Fine-loamy, mixed, mesic Aquic Hapludalfs               |
| Letort-----       | Fine-loamy, mixed, mesic Typic Hapludalfs               |
| Linden-----       | Coarse-loamy, mixed, mesic Fluventic Dystrochrepts      |
| Lindside-----     | Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts      |
| Manor-----        | Coarse-loamy, micaceous, mesic Typic Dystrochrepts      |
| Mount Lucas-----  | Fine-loamy, mixed, mesic Aquic Hapludalfs               |
| Newark-----       | Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents     |
| Nolin-----        | Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts |
| Penlaw-----       | Fine-silty, mixed, mesic Aquic Fragiudalfs              |
| Pequea-----       | Coarse-loamy, mixed, mesic Typic Eutrochrepts           |
| Readington-----   | Fine-loamy, mixed, mesic Typic Fragiudalfs              |
| Rowland-----      | Fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts     |
| Udifluvents-----  | Udifluvents                                             |
| Udorthents-----   | Udorthents                                              |
| Ungers-----       | Fine-loamy, mixed, mesic Typic Hapludults               |

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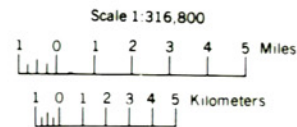
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COLLEGE OF AGRICULTURE  
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES  
STATE CONSERVATION COMMISSION

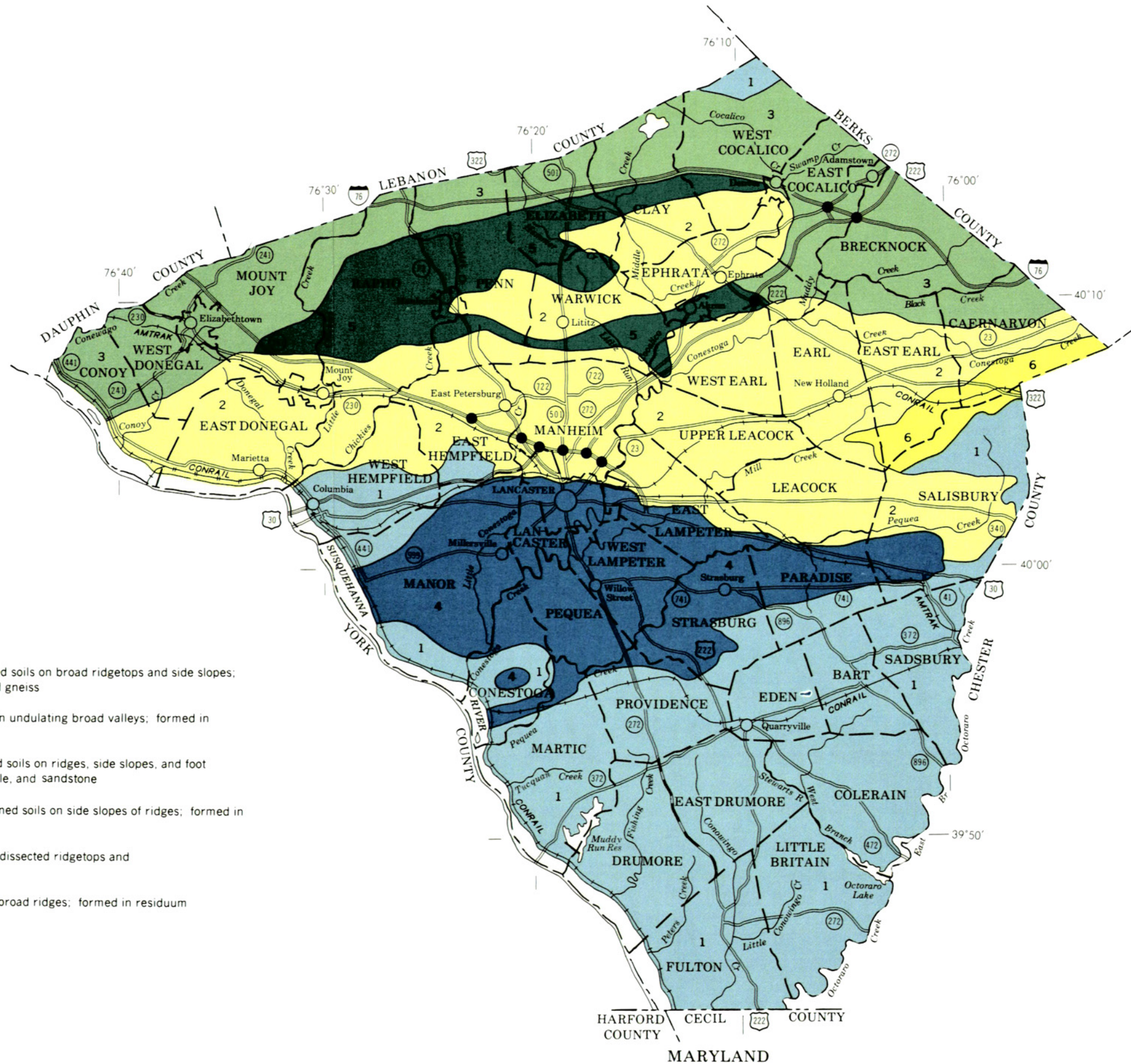
## GENERAL SOIL MAP LANCASTER COUNTY, PENNSYLVANIA



### LEGEND

- 1 MANOR-CHESTER-GLENELG: Nearly level to very steep, well drained soils on broad ridgetops and side slopes; formed in residuum from mica schist, granitized schist, quartzite, and gneiss
- 2 DUFFIELD-HAGERSTOWN: Nearly level to steep, well drained soils in undulating broad valleys; formed in residuum from limestone
- 3 UNGERS-BUCKS-LANSDALE: Nearly level to very steep, well drained soils on ridges, side slopes, and foot slopes; formed in residuum from triassic siltstone, conglomerate, shale, and sandstone
- LETORT-PEQUEA-CONESTOGA: Nearly level to very steep, well drained soils on side slopes of ridges; formed in residuum from graphitic and micaceous limestone and schist
- BEDINGTON: Nearly level to moderately steep, well drained soils on dissected ridgetops and side slopes; formed in residuum from acid shale
- 6 CLYMER-CHESTER: Nearly level to very steep, well drained soils on broad ridges; formed in residuum from sandstone, mica schist, and quartzite

Compiled 1983



Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

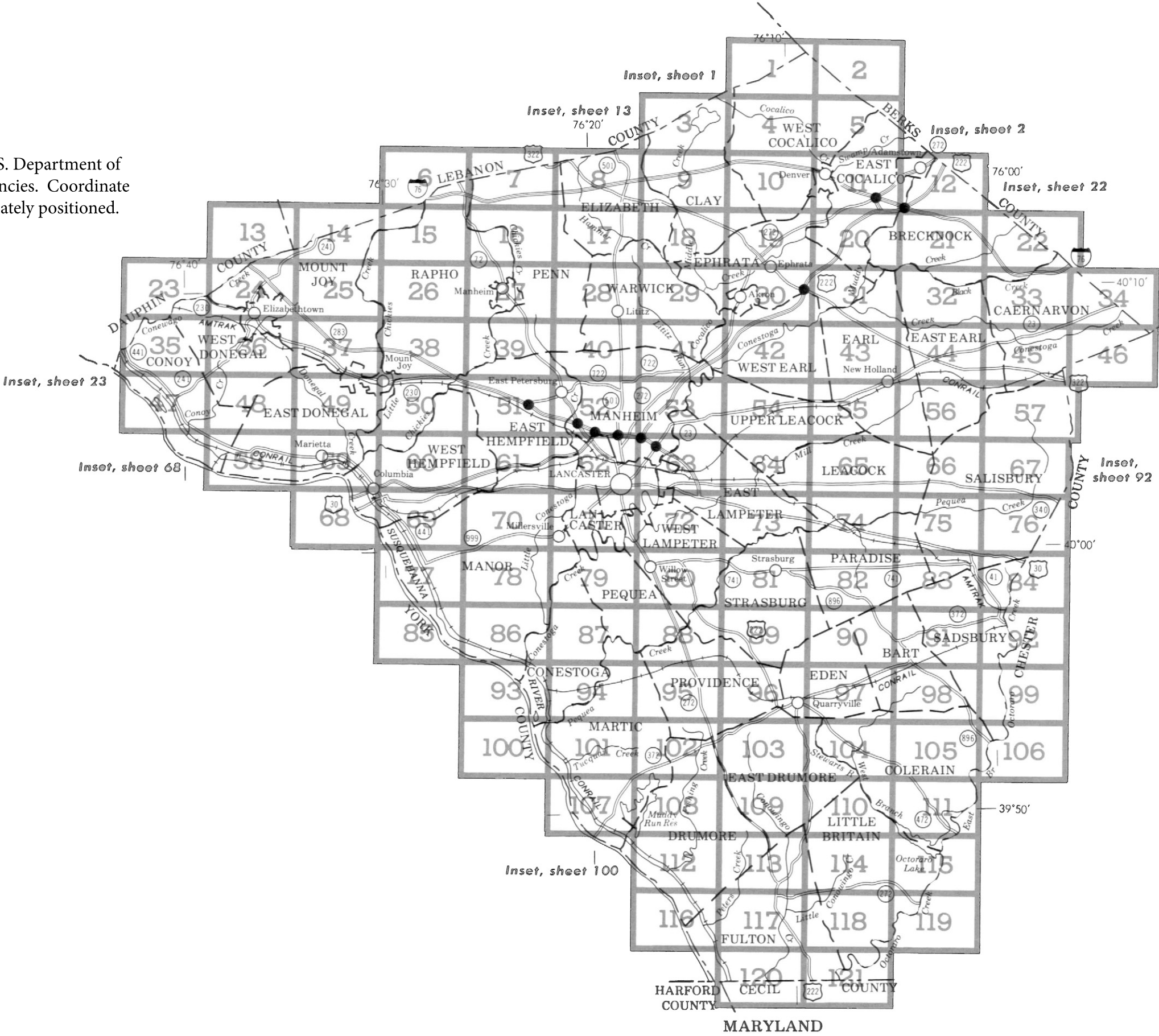
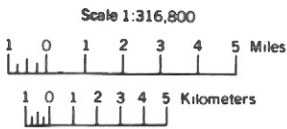




**Original text from each individual map sheet read:**

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

**INDEX TO MAP SHEETS  
LANCASTER COUNTY, PENNSYLVANIA**





## SOIL LEGEND

Publication symbols consist of letters. The first letter, always a capital, is the initial letter of the soil name. The second letter is lower case and separates map units, except those that are slope phases, having names that begin with the same letter. The third letter, always a capital A, B, C, D, E, or F, indicates the class of slope. Symbols without a slope letter are for nearly level soils, soils named for higher categories, or for miscellaneous areas.

| SYMBOL | NAME                                                         | SYMBOL | NAME                                                        |
|--------|--------------------------------------------------------------|--------|-------------------------------------------------------------|
| AbB    | Abbottstown silt loam, 3 to 8 percent slopes                 | LaB    | Lanedale loam, 3 to 8 percent slopes                        |
| AsB    | Abbottstown extremely stony silt loam, 3 to 8 percent slopes | LaC    | Lanedale loam, 8 to 15 percent slopes                       |
|        |                                                              | LaD    | Lanedale loam, 15 to 25 percent slopes                      |
| Ba     | Baile silt loam                                              | LbB    | Lehigh silt loam, 3 to 8 percent slopes                     |
| BdA    | Bedington silt loam, 0 to 3 percent slopes                   | LbC    | Lehigh silt loam, 8 to 15 percent slopes                    |
| BdB    | Bedington silt loam, 3 to 8 percent slopes                   | LdA    | Letort silt loam, 0 to 3 percent slopes                     |
| BdC    | Bedington silt loam, 8 to 15 percent slopes                  | LdB    | Letort silt loam, 3 to 8 percent slopes                     |
| BeD    | Bedington channery silt loam, 15 to 25 percent slopes        | LdC    | Letort silt loam, 8 to 15 percent slopes                    |
| Bm     | Blairton silt loam, 3 to 10 percent slopes                   | Lg     | Linden silt loam                                            |
| Bo     | Bowmansville silt loam                                       | Ln     | Lindside silt loam                                          |
| BrB    | Brecknock gravelly silt loam, 3 to 8 percent slopes          | MaB    | Manor silt loam, 3 to 8 percent slopes                      |
| BrC    | Brecknock gravelly silt loam, 8 to 15 percent slopes         | MaC    | Manor silt loam, 8 to 15 percent slopes                     |
| BsB    | Brecknock very stony silt loam, 3 to 8 percent slopes        | MaD    | Manor silt loam, 15 to 25 percent slopes                    |
| BsC    | Brecknock very stony silt loam, 8 to 25 percent slopes       | MbB    | Manor very stony silt loam, 3 to 8 percent slopes           |
| BuA    | Bucks silt loam, 0 to 3 percent slopes                       | MbD    | Manor very stony silt loam, 8 to 25 percent slopes          |
| BuB    | Bucks silt loam, 3 to 8 percent slopes                       | MbF    | Manor very stony silt loam, 25 to 60 percent slopes         |
| BuC    | Bucks silt loam, 8 to 15 percent slopes                      | MdB    | Mount Lucas silt loam, 3 to 8 percent slopes                |
| BuD    | Bucks silt loam, 15 to 25 percent slopes                     | MeB    | Mount Lucas very stony silt loam, 3 to 12 percent slopes    |
| BxC    | Bucks very stony silt loam, 8 to 25 percent slopes           |        |                                                             |
|        |                                                              | Nc     | Newark silt loam                                            |
| CbA    | Chester silt loam, 0 to 3 percent slopes                     | Nd     | Newark silt loam                                            |
| CbB    | Chester silt loam, 3 to 8 percent slopes                     | Ne     | Nolin silt loam                                             |
| CbC    | Chester silt loam, 8 to 15 percent slopes                    |        |                                                             |
| CkA    | Clarksburg silt loam, 0 to 5 percent slopes                  | Pa     | Penlaw silt loam                                            |
| CIB    | Clymer very stony loam, 3 to 8 percent slopes                | PeC    | Pequea silt loam, 8 to 15 percent slopes                    |
| CID    | Clymer very stony loam, 8 to 25 percent slopes               | PeD    | Pequea silt loam, 15 to 25 percent slopes                   |
| CIF    | Clymer very stony loam, 25 to 50 percent slopes              | PeE    | Pequea silt loam, 25 to 50 percent slopes                   |
| Cm     | Comus silt loam                                              |        |                                                             |
| CnA    | Conestoga silt loam, 0 to 3 percent slopes                   | Qu     | Pits, quarry                                                |
| CnB    | Conestoga silt loam, 3 to 8 percent slopes                   |        |                                                             |
| CnC    | Conestoga silt loam, 8 to 15 percent slopes                  | RaB    | Readington silt loam, 3 to 10 percent slopes                |
|        |                                                              | RbB    | Readington extremely stony silt loam, 3 to 8 percent slopes |
| DbA    | Duffield silt loam, 0 to 3 percent slopes                    | Rd     | Rowland silt loam                                           |
| DbB    | Duffield silt loam, 3 to 8 percent slopes                    |        |                                                             |
|        |                                                              | UaB    | Ungers loam, 3 to 8 percent slopes                          |
| EcA    | Elk silt loam, 0 to 3 percent slopes                         | UaC    | Ungers loam, 8 to 15 percent slopes                         |
| EcB    | Elk silt loam, 3 to 8 percent slopes                         | UaD    | Ungers loam, 15 to 25 percent slopes                        |
| EcC    | Elk silt loam, 8 to 15 percent slopes                        | UbB    | Ungers extremely stony loam, 3 to 8 percent slopes          |
| Eu     | Elk-Urban land complex                                       | UbD    | Ungers extremely stony loam, 8 to 25 percent slopes         |
|        |                                                              | Ube    | Ungers extremely stony loam, 25 to 50 percent slopes        |
| Ff     | Fluvaquents and Udifuvents, loamy                            | Uc     | Urban land                                                  |
|        |                                                              | Ud     | Udorthents, loamy                                           |
| GbB    | Glenelg silt loam, 3 to 8 percent slopes                     | W      | Water                                                       |
| GbC    | Glenelg silt loam, 8 to 15 percent slopes                    |        |                                                             |
| GbD    | Glenelg silt loam, 15 to 25 percent slopes                   |        |                                                             |
| GdB    | Glenville silt loam, 3 to 8 percent slopes                   |        |                                                             |
|        |                                                              |        |                                                             |
| HaA    | Hagerstown silt loam, 0 to 3 percent slopes                  |        |                                                             |
| HaB    | Hagerstown silt loam, 3 to 8 percent slopes                  |        |                                                             |
| HbC    | Hagerstown silty clay loam, 8 to 15 percent slopes           |        |                                                             |
| HbC    | Hagerstown silty clay loam, 15 to 30 percent slopes          |        |                                                             |
| Hc     | Hagerstown-Urban land complex                                |        |                                                             |
| HfA    | Hollinger silt loam, 0 to 3 percent slopes                   |        |                                                             |
| HfB    | Hollinger silt loam, 3 to 8 percent slopes                   |        |                                                             |
| HfC    | Hollinger silt loam, 8 to 15 percent slopes                  |        |                                                             |
| HfD    | Hollinger silt loam, 15 to 25 percent slopes                 |        |                                                             |
| Hg     | Holly silt loam                                              |        |                                                             |

## CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

### CULTURAL FEATURES

| BOUNDARIES                                                                     |               |
|--------------------------------------------------------------------------------|---------------|
| National, state or province                                                    | — — — —       |
| County or parish                                                               | — — — —       |
| Minor civil division                                                           | — — — —       |
| Reservation (national forest or park, state forest or park, and large airport) | — . — —       |
| Land grant                                                                     | — . . — —     |
| Limit of soil survey (label)                                                   | — — — —       |
| Field sheet matchline & neatline                                               | — — — —       |
| AD HOC BOUNDARY (label)                                                        |               |
| Small airport, airfield, park, oilfield, cemetery, or flood pool               |               |
| STATE COORDINATE TICK                                                          |               |
| LAND DIVISION CORNERS (sections and land grants)                               |               |
| ROADS                                                                          |               |
| Divided (median shown if scale permits)                                        | ==            |
| Other roads                                                                    | — — — —       |
| Trail                                                                          | - - - - -     |
| ROAD EMBLEM & DESIGNATIONS                                                     |               |
| Interstate                                                                     |               |
| Federal                                                                        |               |
| State                                                                          |               |
| County, farm or ranch                                                          |               |
| RAILROAD                                                                       |               |
| POWER TRANSMISSION LINE (normally not shown)                                   | — . . . . —   |
| PIPE LINE (normally not shown)                                                 | —   —   —   — |
| FENCE (normally not shown)                                                     | — x — x — x — |
| LEVEES                                                                         |               |
| Without road                                                                   |               |
| With road                                                                      |               |
| With railroad                                                                  |               |
| DAMS                                                                           |               |
| Large (to scale)                                                               |               |
| Medium or small                                                                |               |
| PITS                                                                           |               |
| Gravel pit                                                                     |               |
| Mine or quarry                                                                 |               |

| MISCELLANEOUS CULTURAL FEATURES        |       |
|----------------------------------------|-------|
| Farmstead, house (omit in urban areas) | •     |
| Church                                 | ✠     |
| School                                 | ✎     |
| Indian mound (label)                   |       |
| Located object (label)                 |       |
| Tank (label)                           | • Gas |
| Wells, oil or gas                      | ⊙     |
| Windmill                               | ⊗     |
| Kitchen midden                         | —     |

### WATER FEATURES

| DRAINAGE                     |   |
|------------------------------|---|
| Perennial, double line       |   |
| Perennial, single line       |   |
| Intermittent                 |   |
| Drainage end                 |   |
| Canals or ditches            |   |
| Double-line (label)          |   |
| Drainage and/or irrigation   |   |
| LAKES, PONDS AND RESERVOIRS  |   |
| Perennial                    |   |
| Intermittent                 |   |
| MISCELLANEOUS WATER FEATURES |   |
| Marsh or swamp               |   |
| Spring                       |   |
| Well, artesian               | ⬆ |
| Well, irrigation             | ⬆ |
| Wet spot                     | ⬇ |

### SPECIAL SYMBOLS FOR SOIL SURVEY

| SOIL DELINEATIONS AND SYMBOLS               |     |
|---------------------------------------------|-----|
| ESCARPMENTS                                 |     |
| Bedrock (points down slope)                 |     |
| Other than bedrock (points down slope)      |     |
| SHORT STEEP SLOPE                           |     |
| GULLY                                       |     |
| DEPRESSION OR SINK                          | ◊   |
| SOIL SAMPLE SITE (normally not shown)       | ⊙   |
| MISCELLANEOUS                               |     |
| Blowout                                     | ∪   |
| Clay spot                                   | ⊗   |
| Gravelly spot                               | ⊙   |
| Gumbo, slick or scabby spot (sodic)         | ⊙   |
| Dumps and other similar non soil areas      | ≡   |
| Prominent hill or peak                      |     |
| Rock outcrop (includes sandstone and shale) | ∨   |
| Saline spot                                 | +   |
| Sandy spot                                  | ∴   |
| Severely eroded spot                        | ≡   |
| Slide or slip (tips point upslope)          |     |
| Stony spot, very stony spot                 | ⊙ □ |

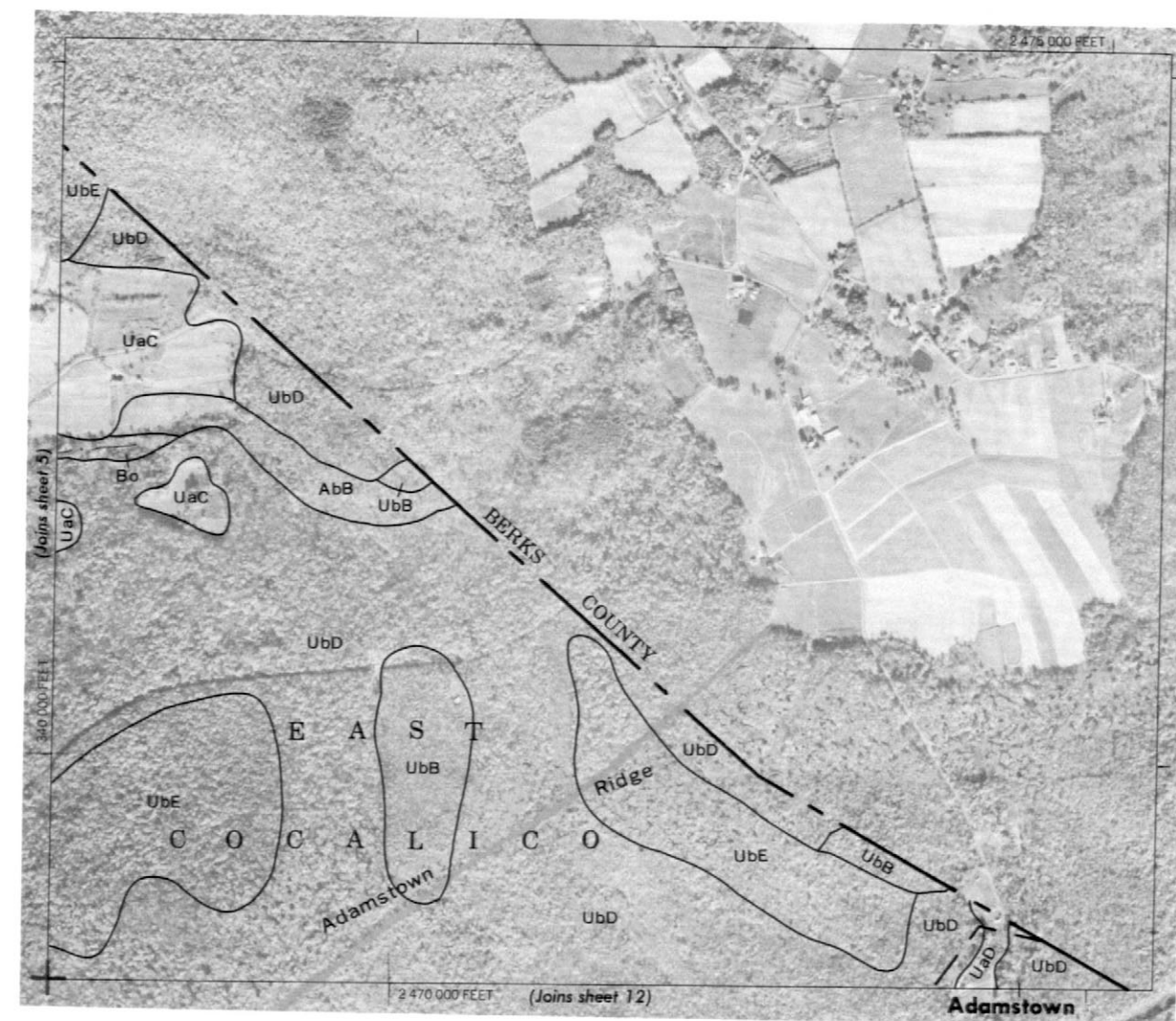
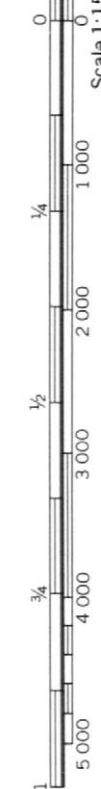




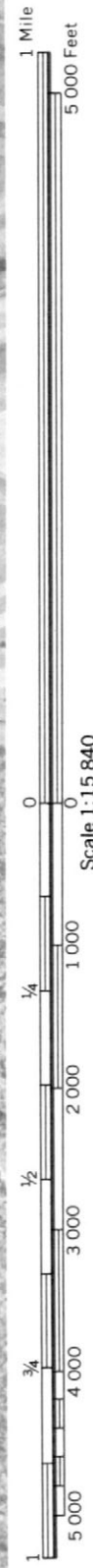




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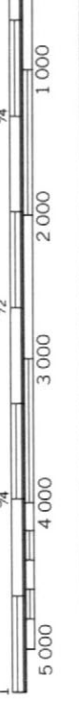


6



1 Mile  
5 000 Feet

Scale 1:15 840



2 330 000 FEET

(Joins sheet 15)

(Joins sheet 7)

2 365 000 FEET

2 365 000 FEET

























1 Mile  
5,000 Feet

Scale 1:15,840



EAST  
COCALICO

Adamstown

B  
R  
E  
C  
K  
N  
O  
C  
K

BERKS  
COUNTY

Little  
Muddy  
Creek

Muddy  
Creek

PENNSYLVANIA

16

272

222

897

897

525

625

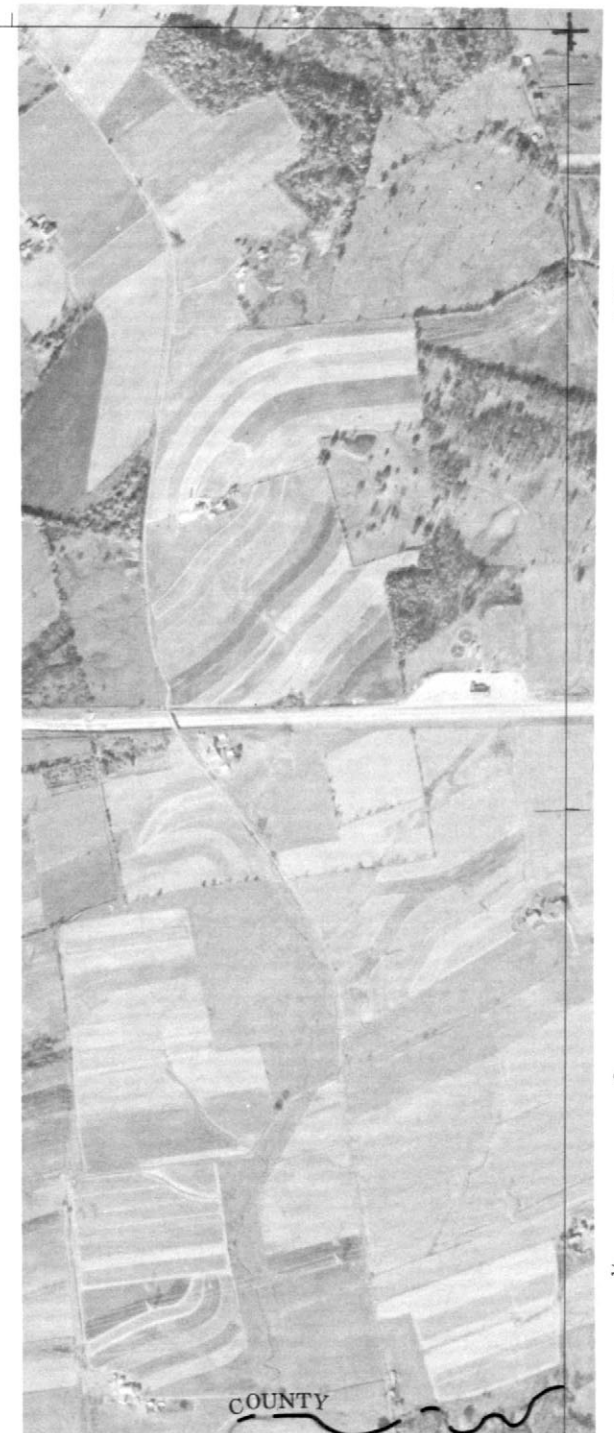
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2 485 000 FEET

2 470 000 FEET (Joins sheet 21)

(Joins inset, sheet 22)









1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4



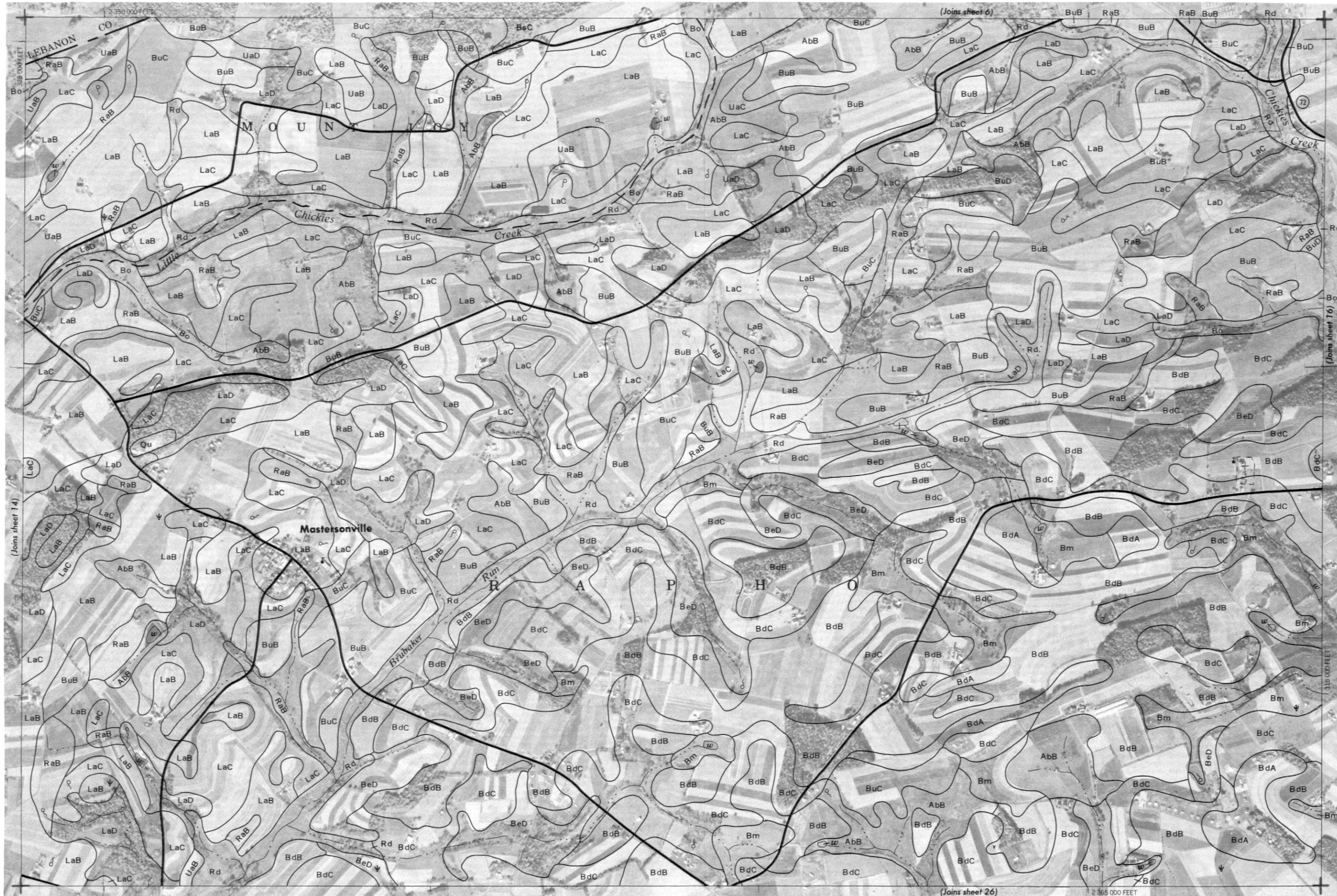
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2 330 000 FEET

(Joins sheet 25)

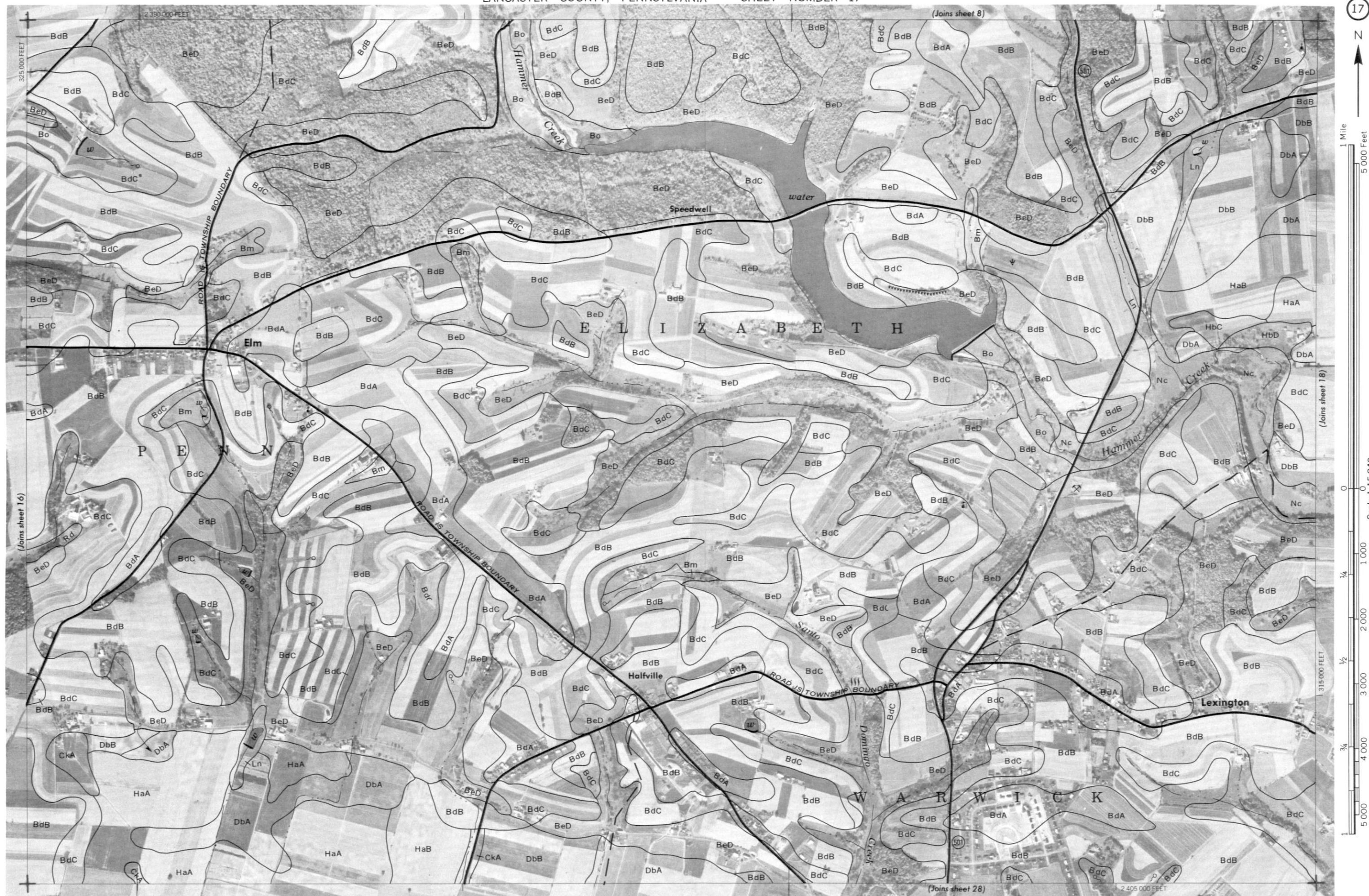
















1 Mile  
5 000 Feet

Scale 1:15 840







19

N

1 Mile

5 000 Feet

0

1 000

2 000

3 000

4 000

5 000

Scale 1:15 840













1 Mile

5 000 Feet

0

1 000

2 000

3 000

4 000

5 000

Scale 1:15 840

0

1 000

2 000

3 000

4 000

5 000

0

1 000

2 000

3 000

4 000

5 000

0

1 000

2 000

3 000

4 000

5 000

0

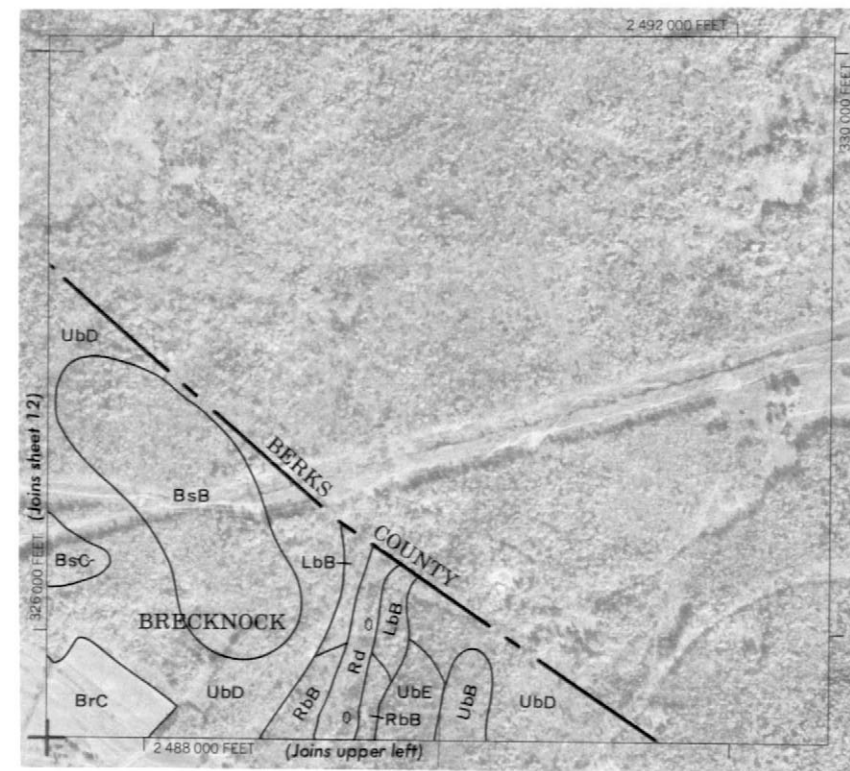
1 000

2 000

3 000

4 000

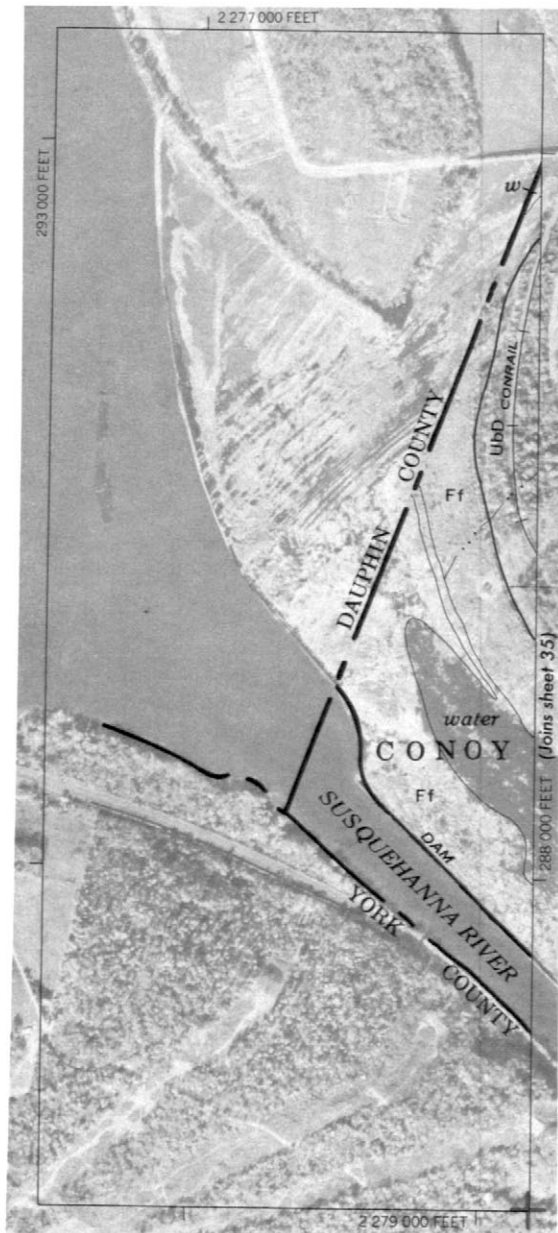
5 000



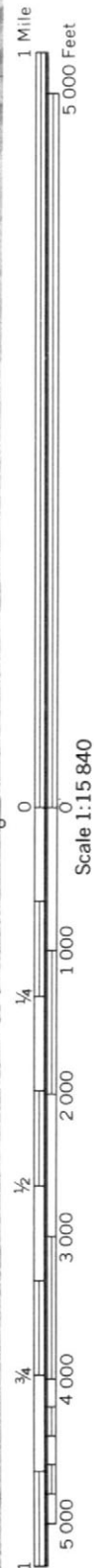
325 000 FEET

(Joins 34)

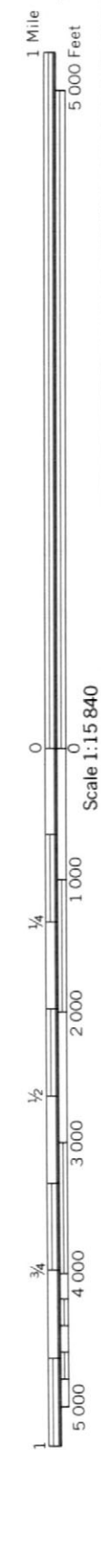




2000 AND 5000-FOOT GRID TICKS











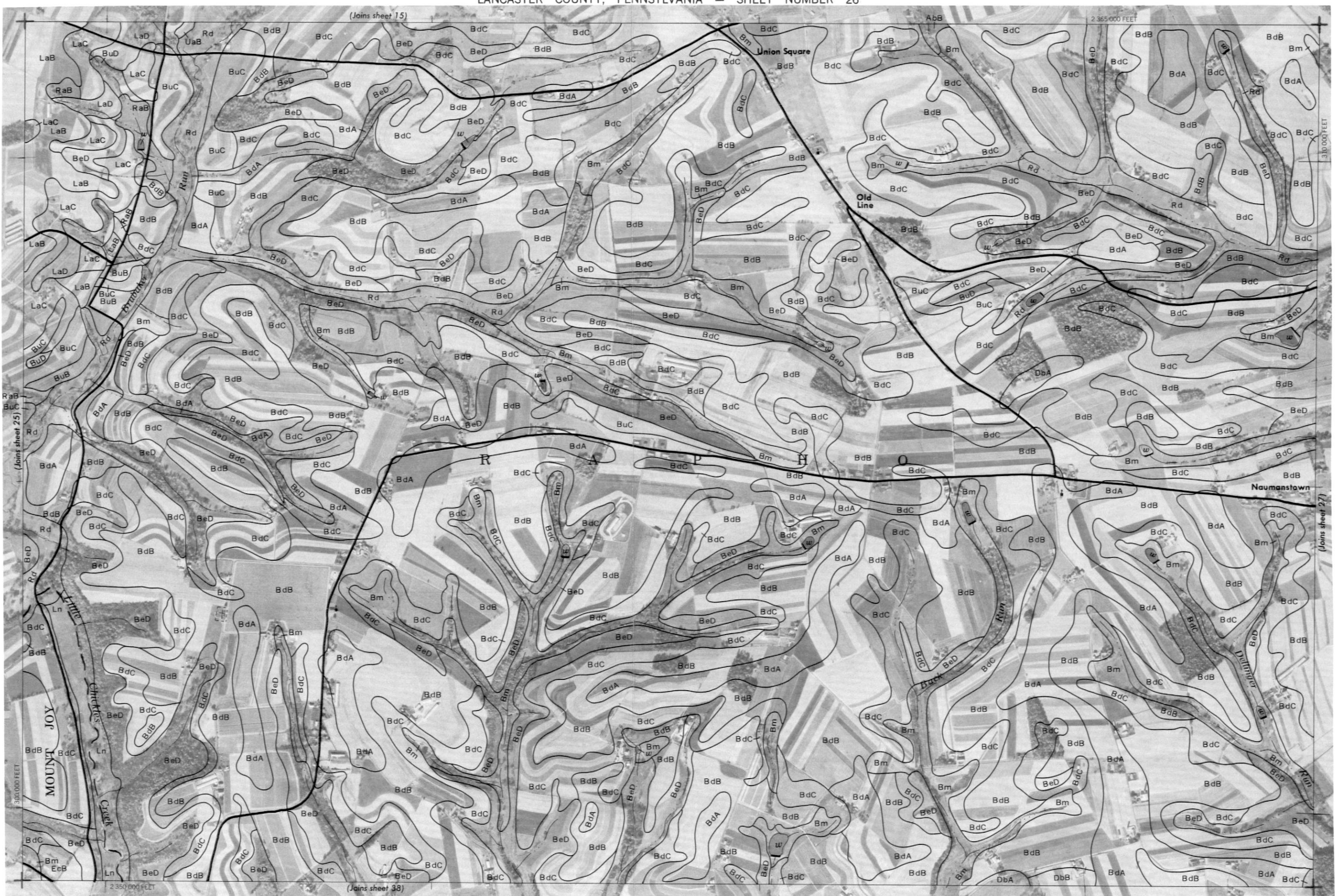




1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4











1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4











1 Mile

5 000 Feet

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0

0



(Joins sheet 19)

2 445 000 FEET

310 000 FEET

(Joins sheet 29)

Scale 1:15 840

(Joins sheet 31)

WARWICK

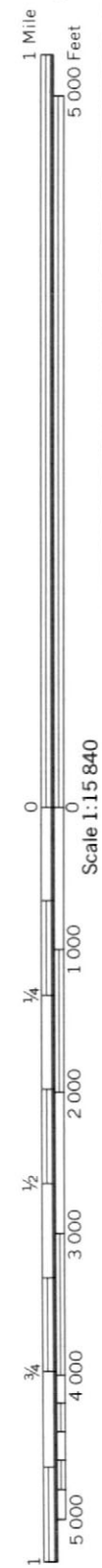
2 430 000 FEET

(Joins sheet 42)

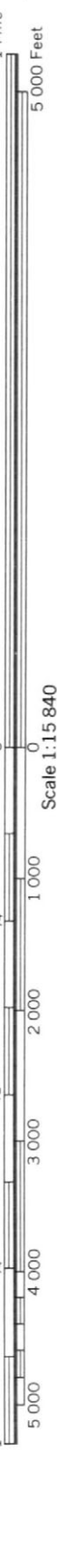




















35

N

1 Mile

5 000 Feet

0 1 000 2 000 3 000 4 000 5 000

Scale 1:15 840





1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4



2 310 000 FEET

(Joins sheet 48)

2 325 000 FEET

2 350 000 FEET

(Joins sheet 37)









1 Mile  
5 000 Feet

Scale 1:15 840

0  
1 000  
2 000  
3 000  
4 000  
5 000



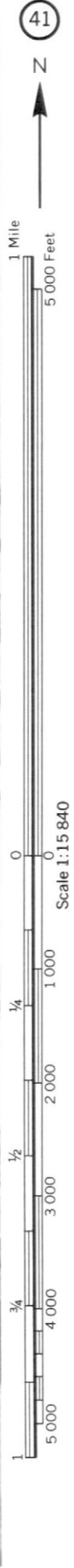
















1 Mile  
5 000 Feet

Scale 1:15 840

0  
1/4  
1 000  
2 000  
3 000  
4 000  
5 000











1 Mile  
5 000 Feet

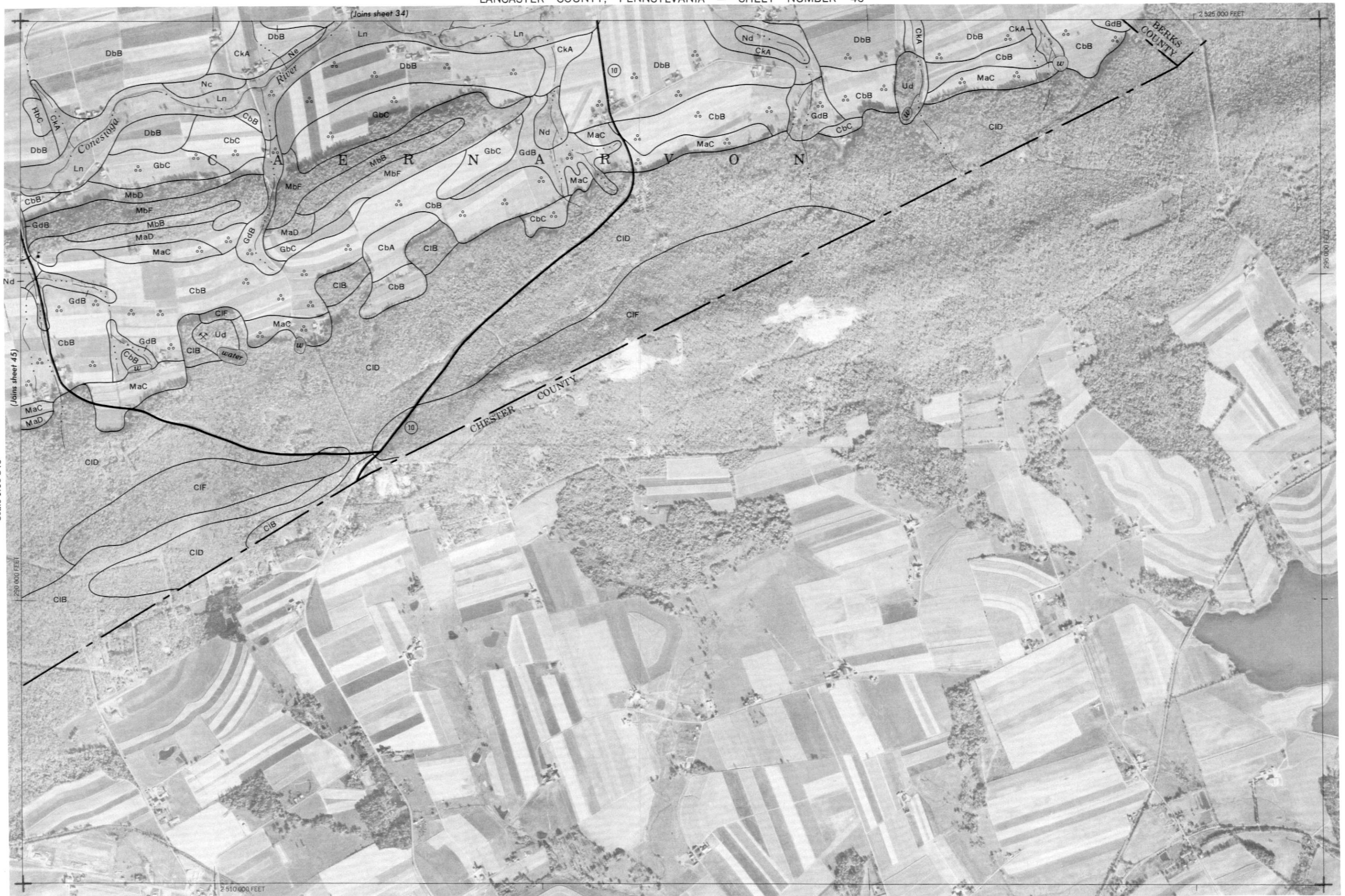
Scale 1:15 840



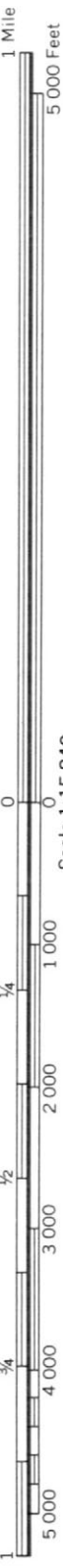




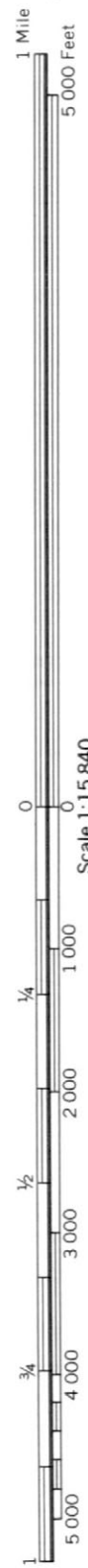




























1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4



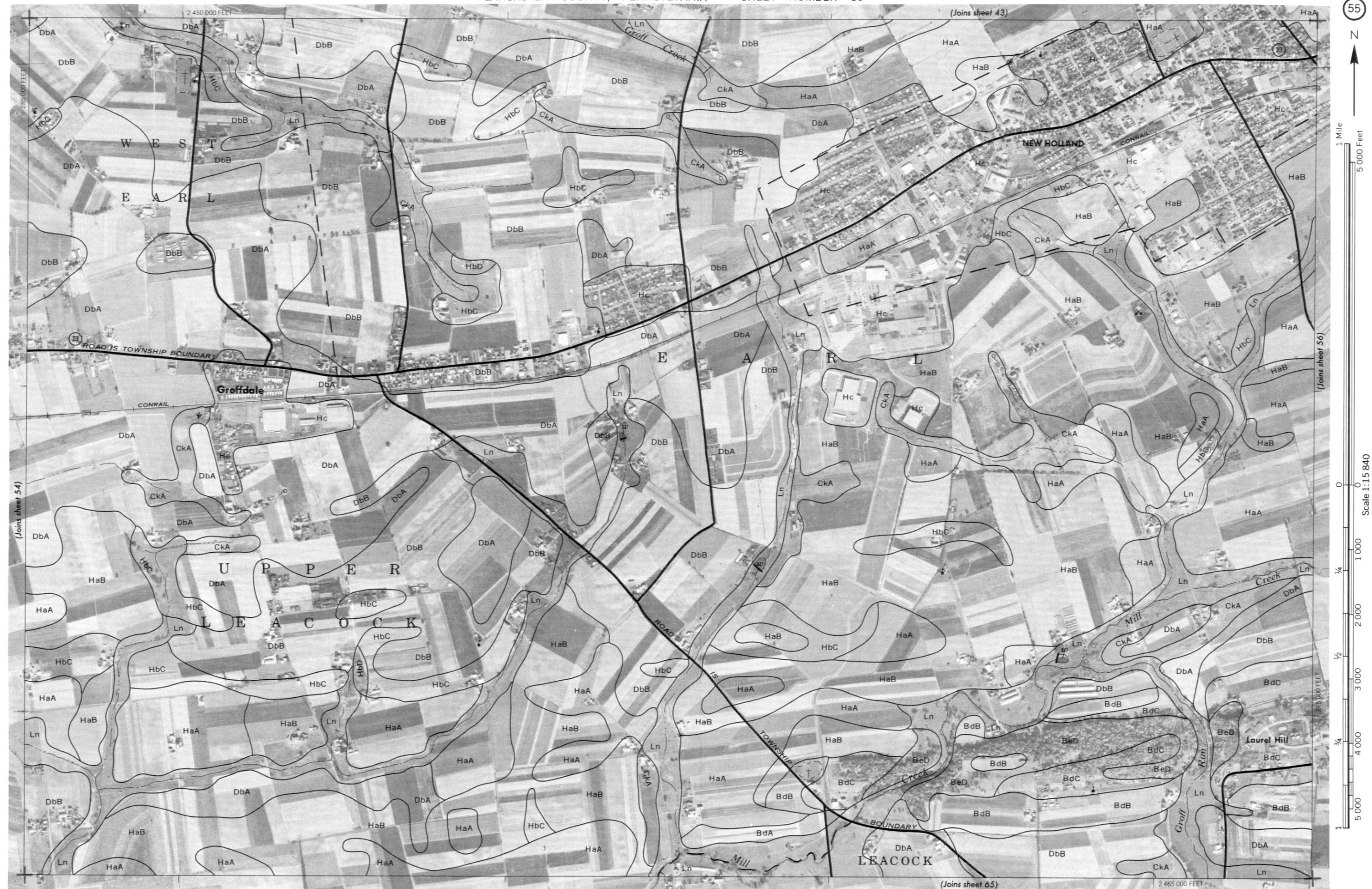














(Joins sheet 44)

2 485 000 FEET

2 485 000 FEET



1 Mile  
5 000 Feet



(Joins sheet 55)

(Joins sheet 57)

Scale 1:15 840



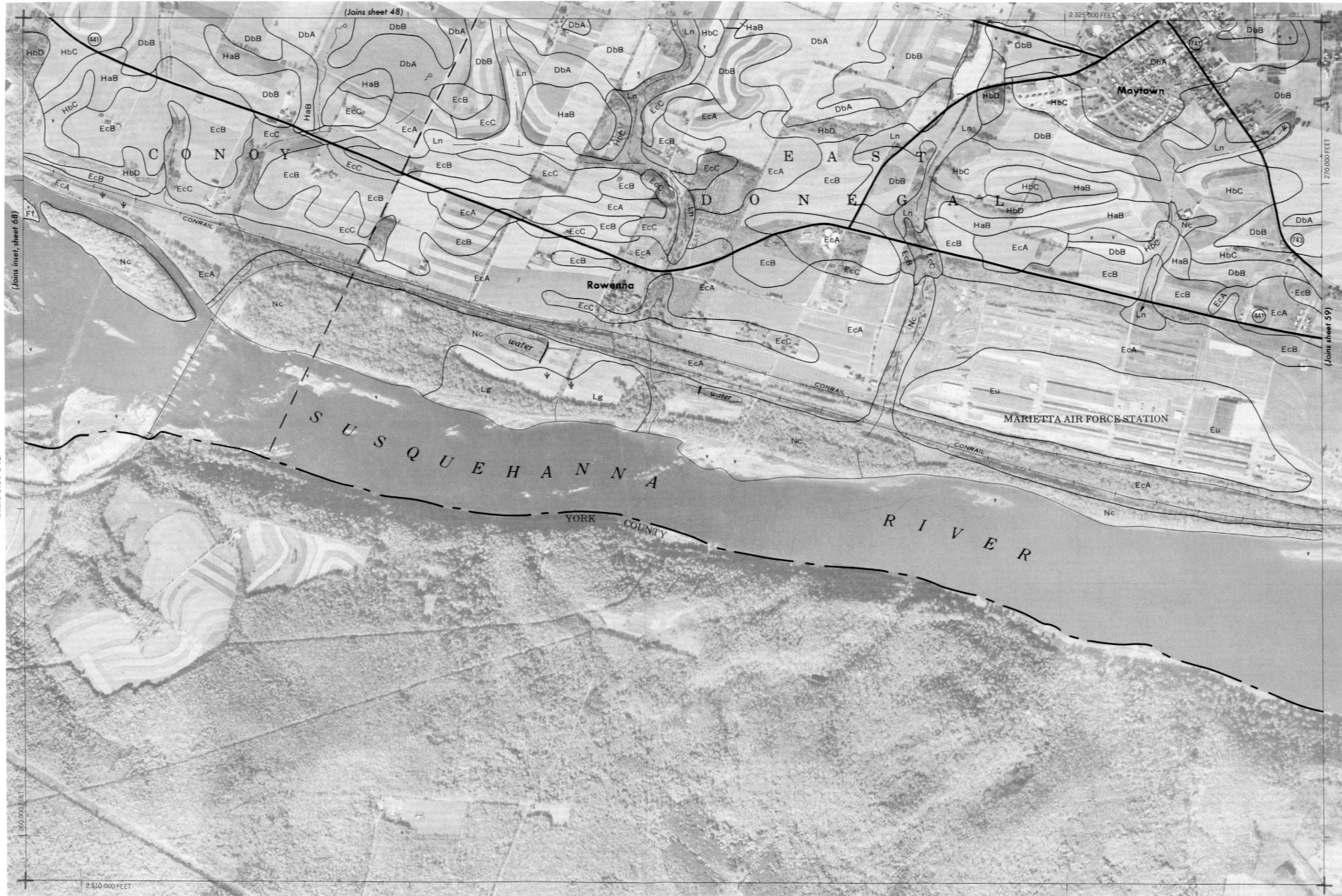
2 470 000 FEET

(Joins sheet 66)

















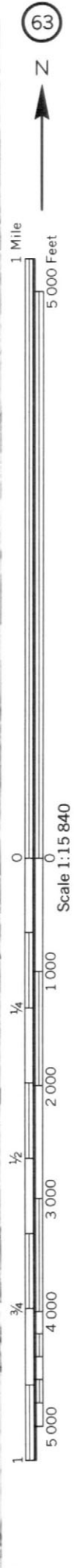
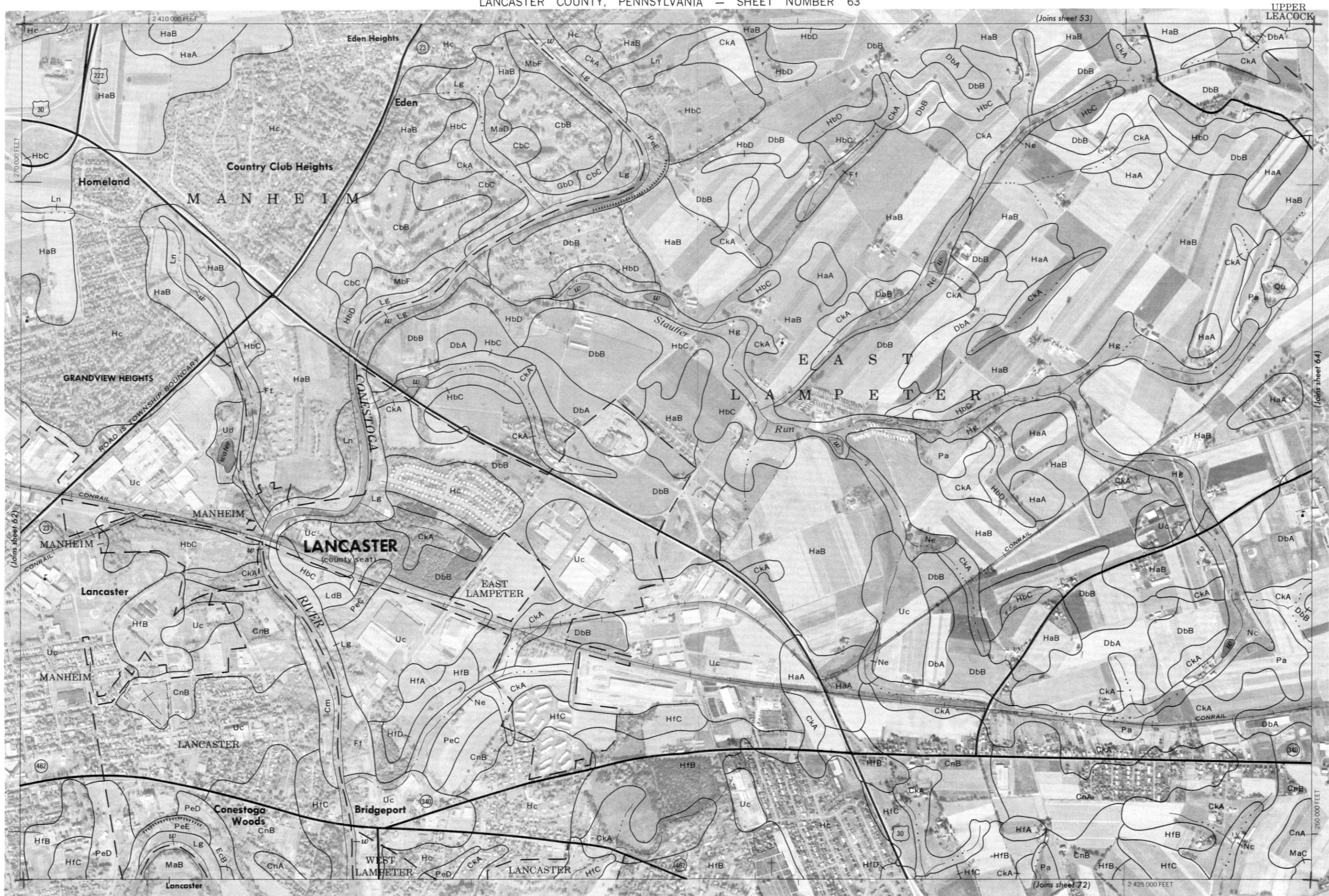


























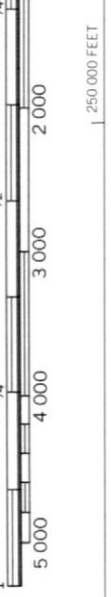






1 Mile  
5 000 Feet

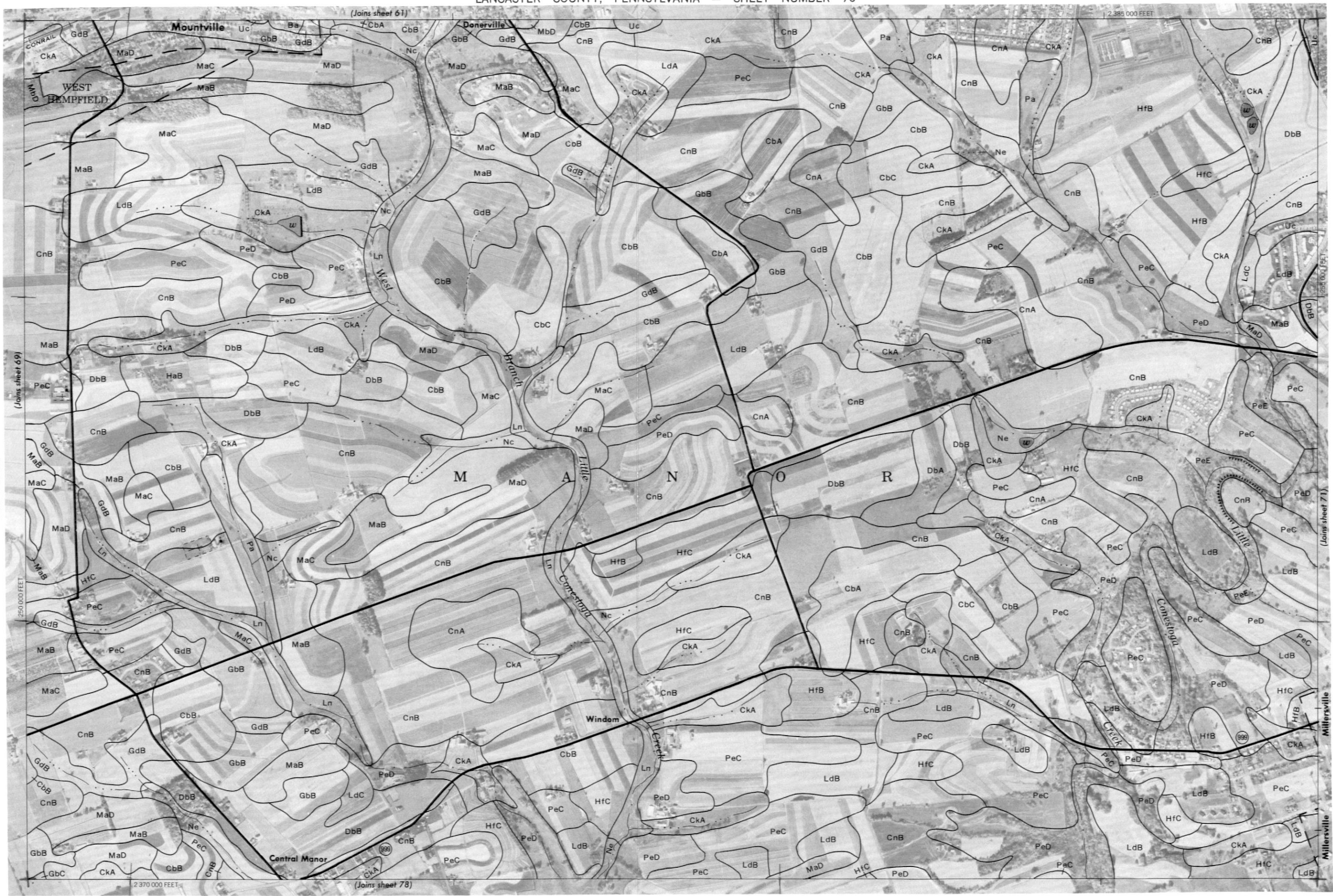
Scale 1:15 840































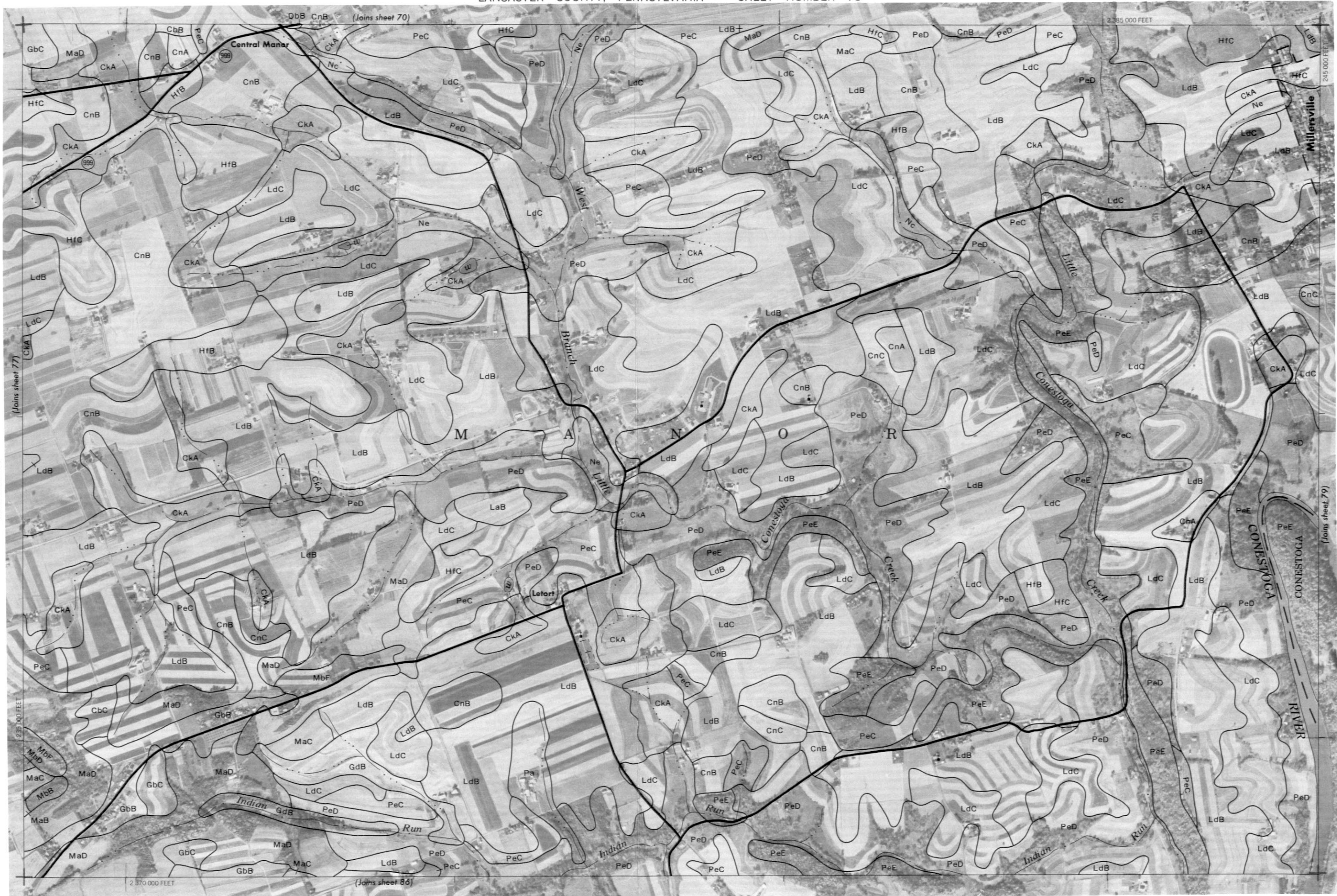




















1 Mile  
5 000 Feet

Scale 1:15 840

1/4

1 000

2 000

3 000

4 000

5 000

3/4

1











1 Mile  
5,000 Feet

Scale 1:15,840

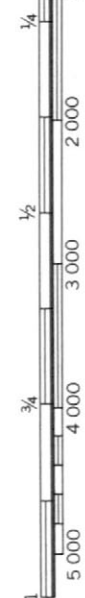
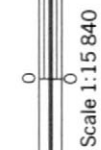
0 1,000 2,000 3,000 4,000 5,000  
1/4 1/2 3/4



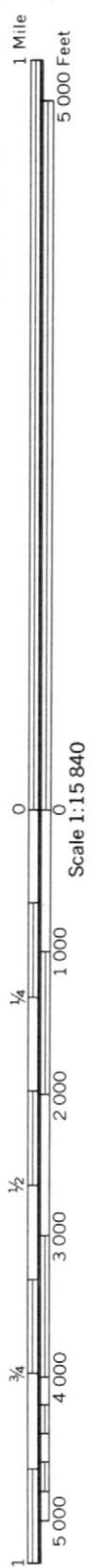








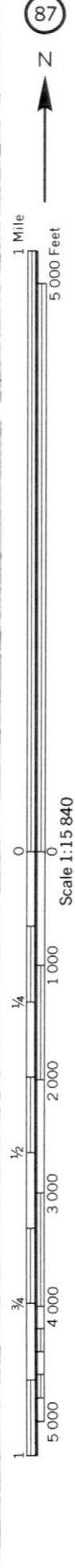
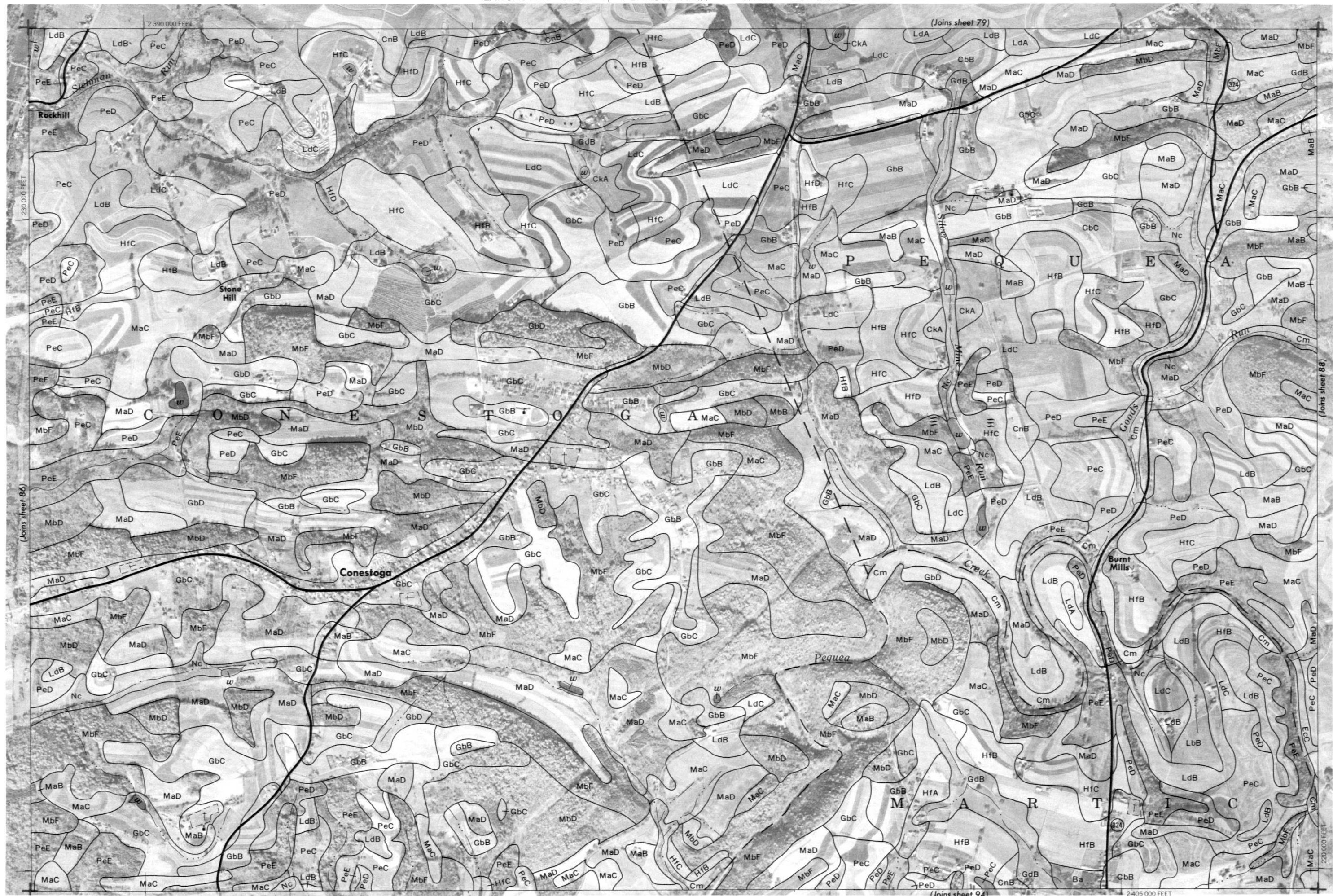








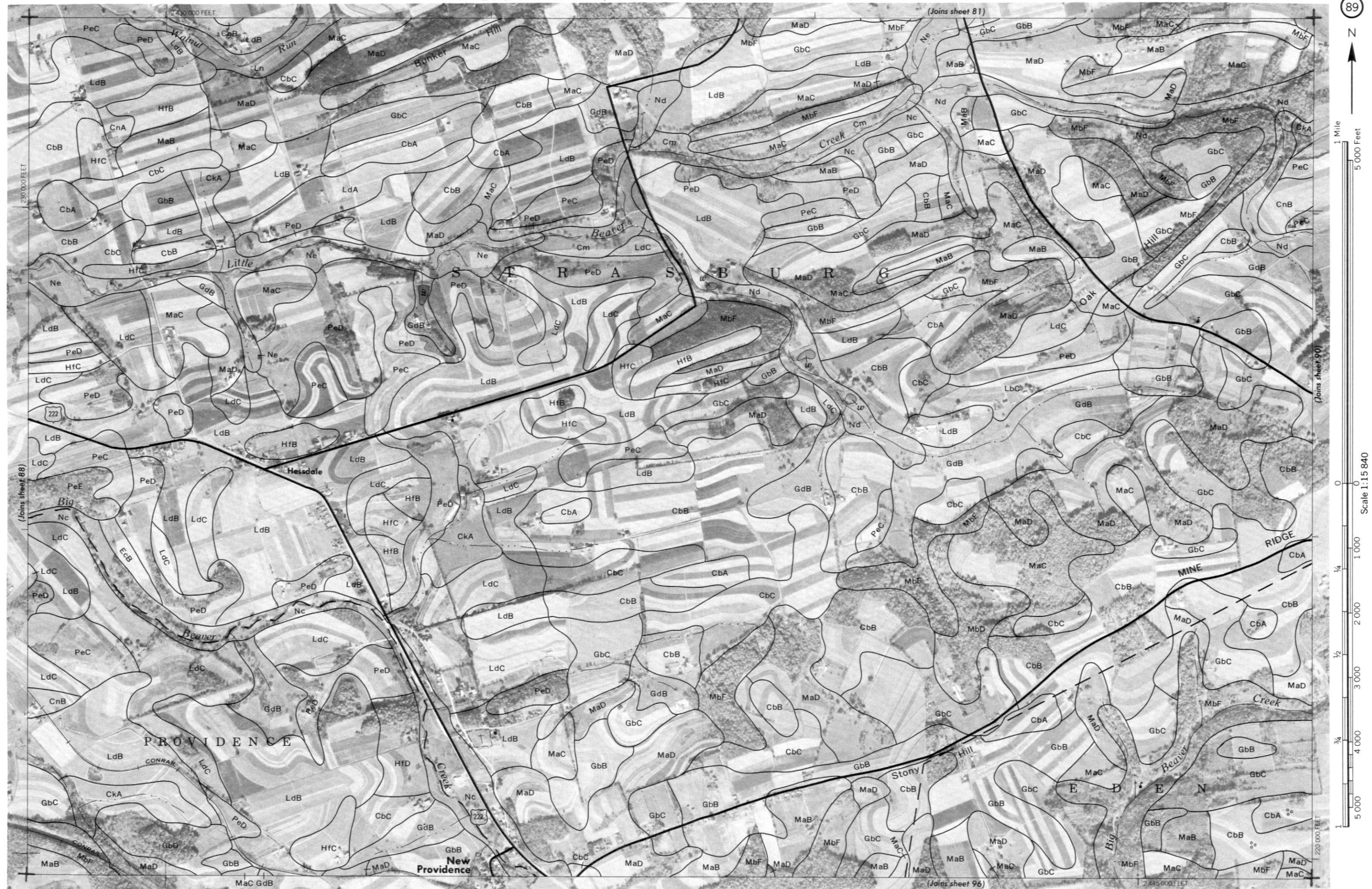




























93

N

1 Mile

5 000 Feet

0 1 000 2 000 3 000 4 000 5 000

1/4 1/2 3/4

Scale 1:15 840





1 Mile  
5 000 Feet

Scale 1:15 840

1/4

1 000

2 000

3 000

4 000

5 000

1/2

3 000

4 000

5 000

3/4

4 000

5 000

1

5 000

1

5 000

1



2405 000 FEET

Marbleville

C O N E S T O G A

M A R T I C

Marble Forge

Colemanville

Pequea

Red

(Joins sheet 95)

(Joins sheet 93)

(Joins sheet 101)

2399 000 FEET





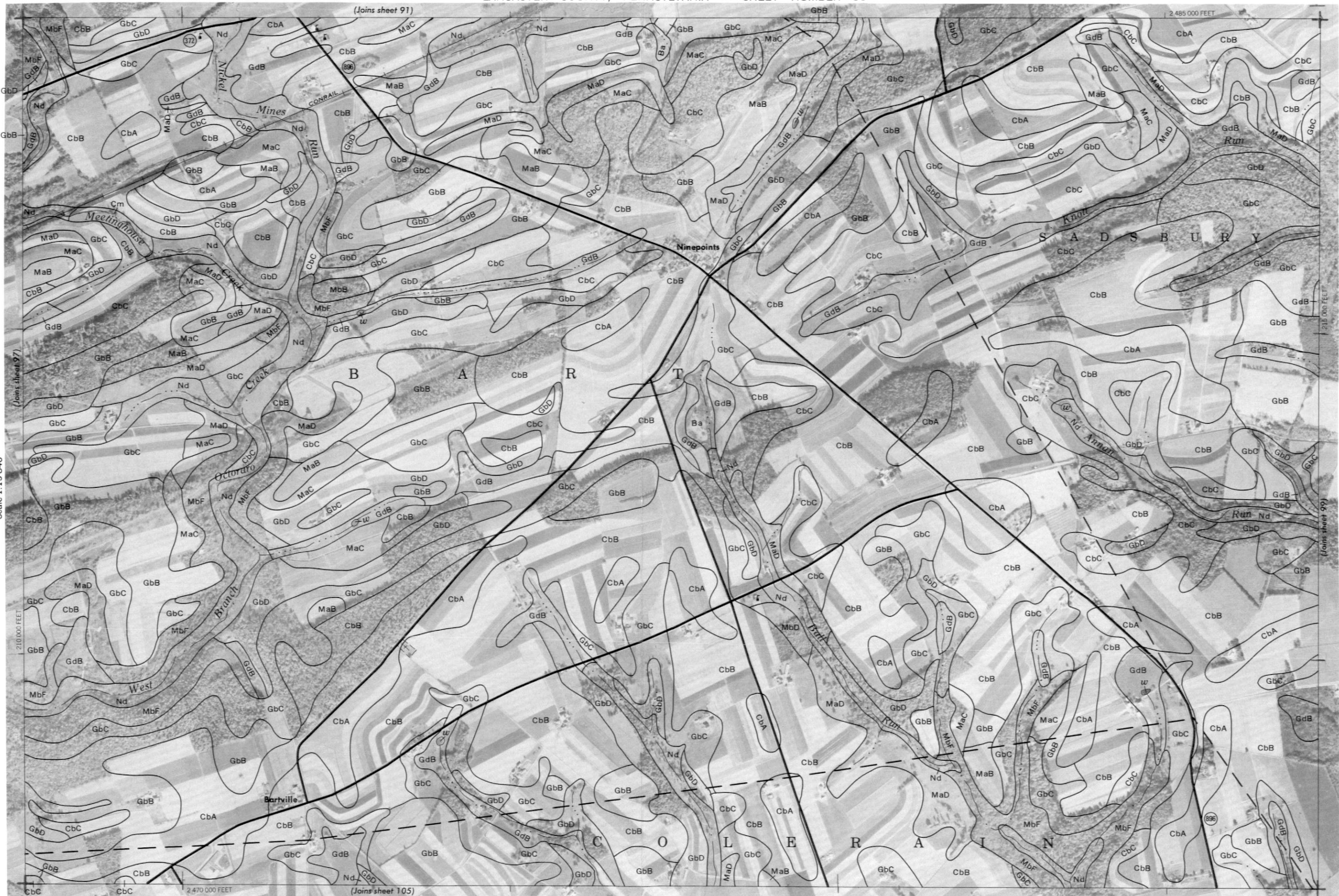


















100

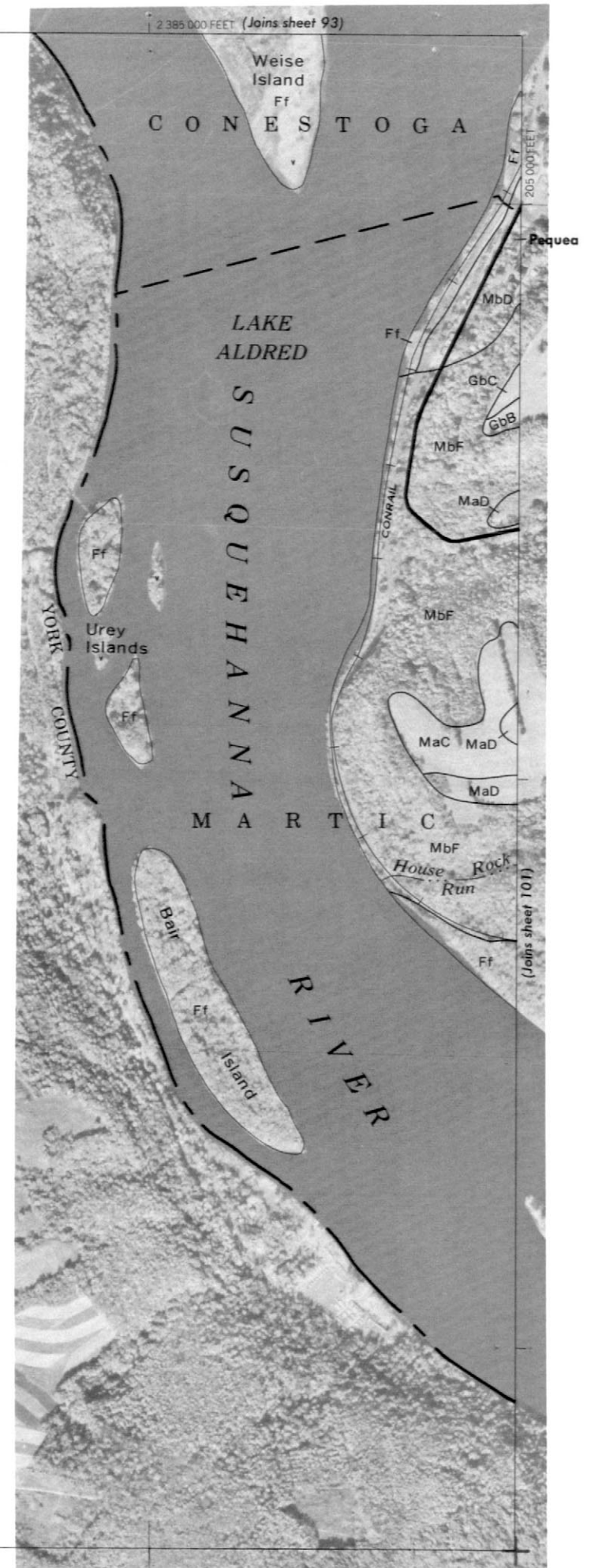


1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

195 000 FEET











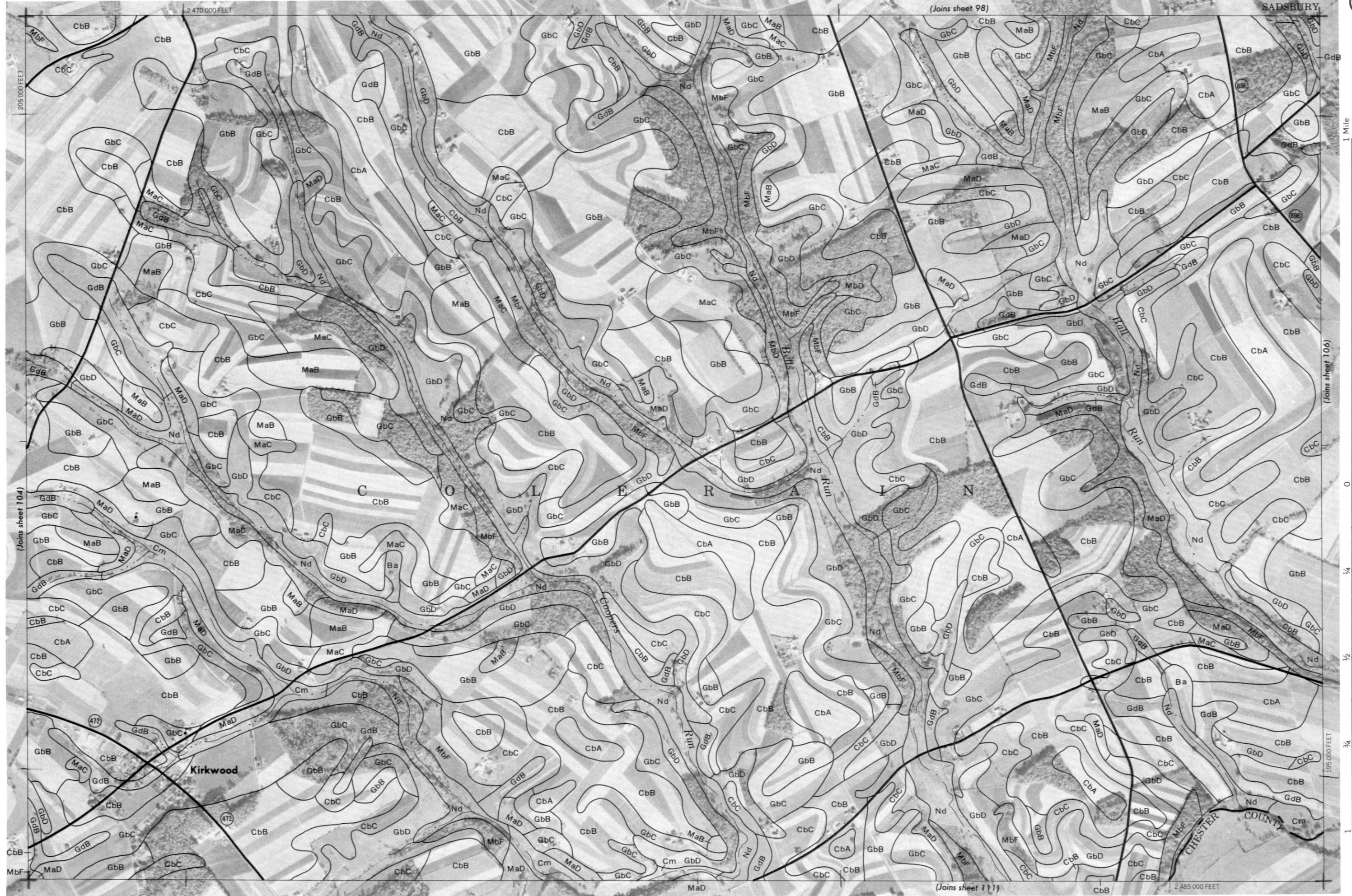












1 Mile  
5 000 Feet

Scale 1:15 840

1 500 000 FEET  
1 2 3 4 5  
1/4 1/2 3/4







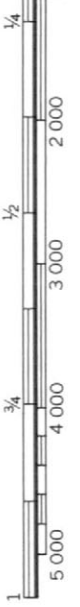






1 Mile  
5 000 Feet

Scale 1:15840











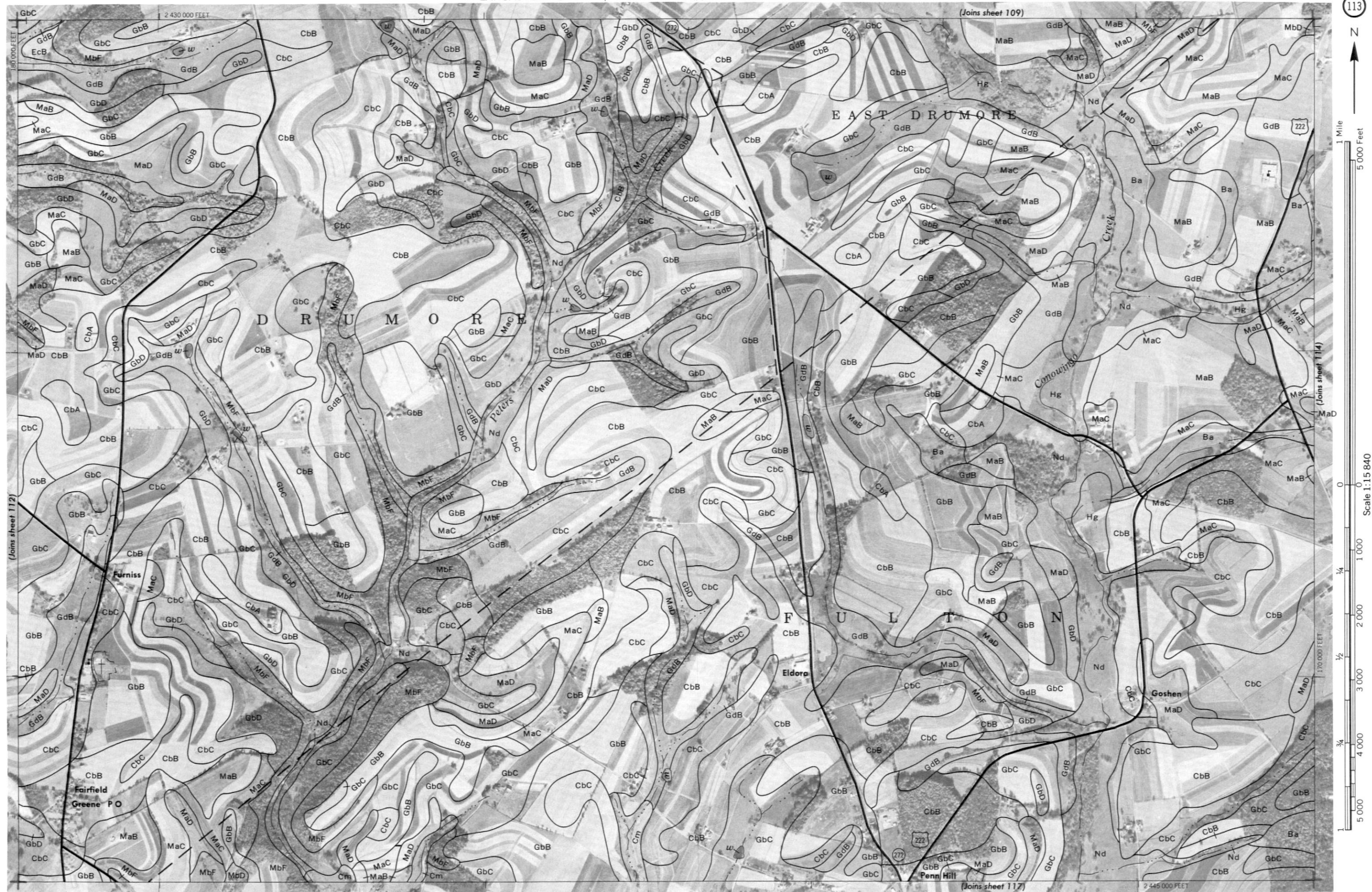








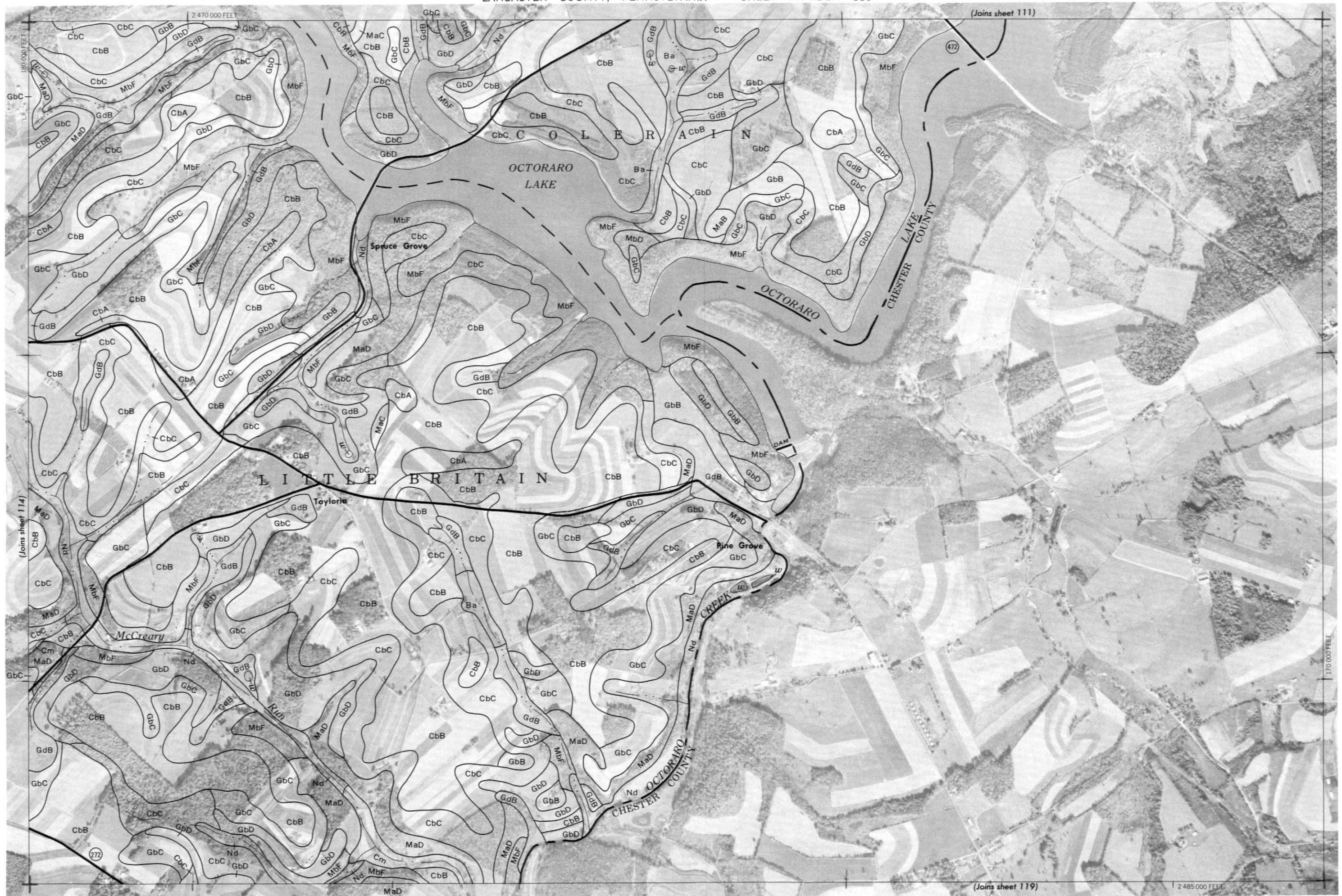












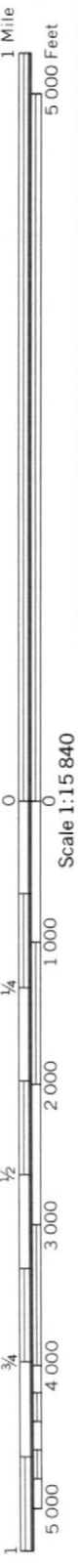




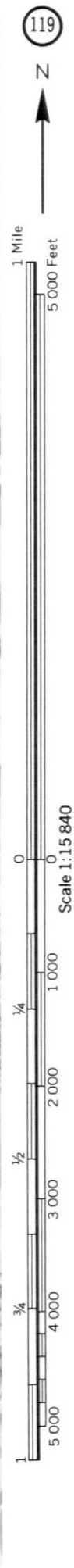












Scale 1:15 840





1 Mile  
5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000  
1/4 1/2 3/4





